

MESA I: CIRUGIA DE PRESERVACION DE CADERA INESTABLE

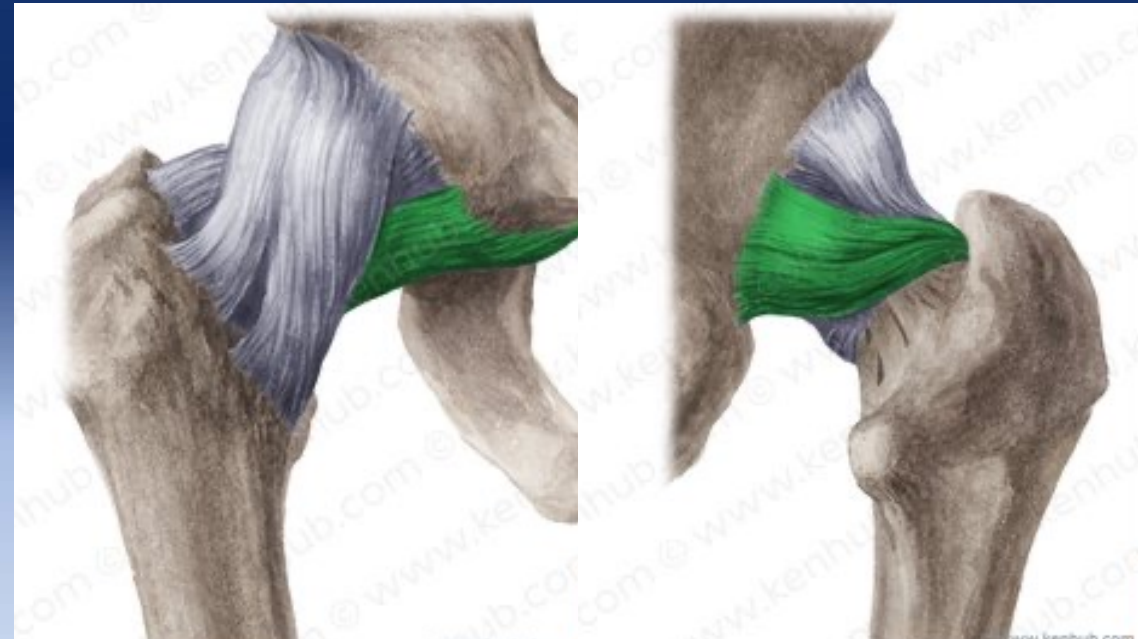
LA CAPSULA SIEMPRE CERRADITA

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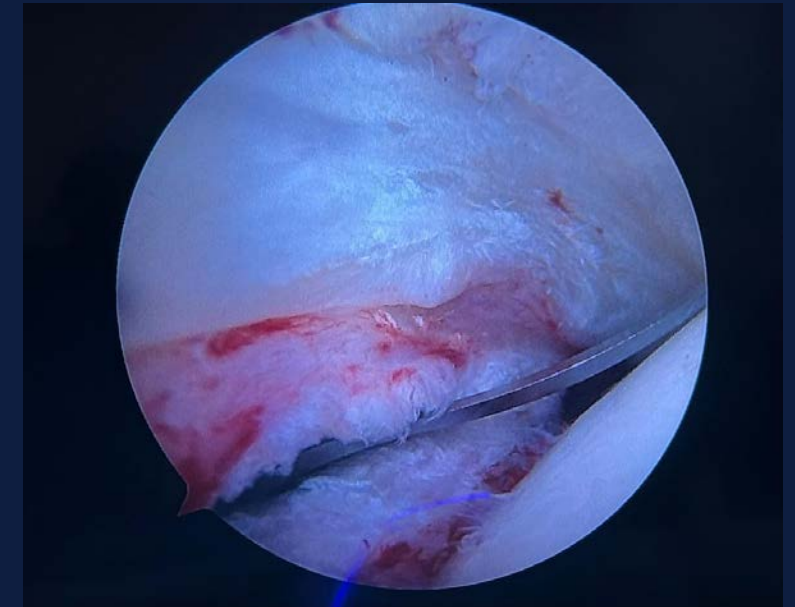
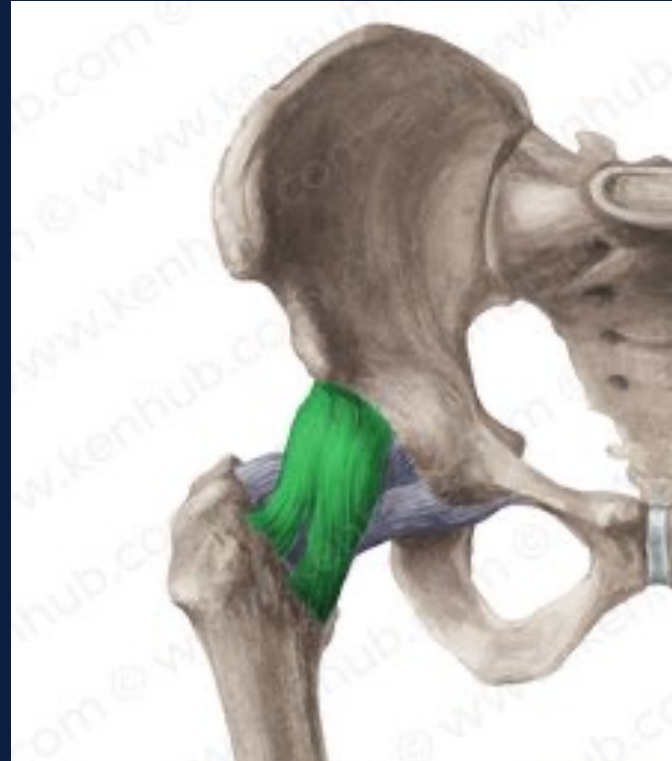


INTRODUCCION

- AUMENTO EXPONENCIAL N° CX ARTROSCOPICAS >>>MEJORA CONOCIMIENTO DE LA FISIOPATOLOGIA DE LA CADERA, FUNDAMENTALMENTE EN LESIONES DEL LABRUM Y CHOQUE FEMOROACETABULAR
- CAPSULA HA QUEDADO "OLVIDADA"
 - CADERA ES ESTABLE
 - DIFICULTAD CIERRE
 - FALTA CONOCIMIENTO FUNCION REAL



LA **CAPSULOTOMIA** (NECESARIA PARA EL TRATAMIENTO DEL FAI, LABRUM ..) (INTERPORTAL, T) **LESIONA** EL LIGAMENTO ILIOFEMORAL, EL MÁS POTENTE ESTABILIZADOR DE LA CAPSULA



ESTUDIOS EXPERIMENTALES BIOMECANICOS EN CADAVER
IMPORTANCIA DE LA CAPSULA EN ESTABILIDAD DE LA CADERA
EFECTO ADVERSO DE LA CAPSULOTOMIA
REPARACION DE LA CAPSULOTOMIA PERMITE RESTAURAR "BIOMECANICA NORMAL" EN LA ARTICULACION

Hip Capsular Management in Patients With Femoroacetabular Impingement or Microinstability: A Systematic Review of Biomechanical Studies



Andrew E. Jimenez, M.D., Jade S. Owens, B.S., Jacob Shapira, M.D., Benjamin R. Saks, M.D., Hari K. Ankem, M.D., Payam W. Sabetian, M.D., Ajay C. Lall, M.D., M.S., and Benjamin G. Domb, M.D.

Purpose: To investigate the correlation between hip capsular management (repair or reconstruction) and biomechanical results in the setting of femoroacetabular impingement and microinstability. **Methods:** A search of the PubMed and Embase databases was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Included studies focused on hip biomechanics related to capsular release, repair of I- and T-capsulotomy, or capsular reconstruction. Studies were assessed for external/internal rotation of the femur, femoral head translation, rotational torque, and distraction force. Articles were excluded if they discussed treatment of the hip capsule related to surgical dislocation, mini-open surgery, arthroplasty, reorientation osteotomy, or traumatic dislocation. **Results:** Twenty-four biomechanical studies were included that evaluated rotation/translation (11 studies), distraction (3 studies), the capsular role in microinstability (simulated with anterior capsule pie crusting [2 studies] and cyclical loading [2 studies]), allograft reconstruction (3 studies), and anatomic properties (3 studies). Repair and reconstruction demonstrated improvements in maximum distractive force, total ROM, and torsional stability when compared to capsular release. Significant differences were observed between capsular repair and release in total ROM in the coronal plane with improved stability in the repair groups (standardized mean difference [SMD]: -1.3° , 95% confidence interval [CI] -1.68 , -0.854 ; $P < .001$). There was significantly increased total motion in the coronal plane in the capsular laxity state compared to the native state (SMD: 1.4° (95% CI 0.32, 2.49; $P = .012$). **Conclusions:** Biomechanical evidence supports closure of the capsule after hip arthroscopy to reverse the significant effects of capsulotomy. Simulated capsule laxity models created altered joint motion and translation. Capsule reconstruction appears to restore the hip to its native capsule state. **Clinical Relevance:** Investigating the biomechanical outcomes of capsular repair and reconstruction will help surgeons better understand the rationale and implications of these capsular management strategies.

See commentary on page 2655

From the American Hip Institute Research Foundation (A.E.J., J.S.O., J.S., B.R.S., H.K.A., P.W.S., A.C.L., B.G.D.), Chicago, Illinois; American Hip Institute (A.C.L.), Chicago, Illinois; and AMITA Health St. Alexius Medical Center (B.R.S., A.C.L., B.G.D.), Hoffman Estates, Illinois, U.S.A.

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- 24 ARTICULOS ESTUDIOS EXPERIMENTALES
- CAPSULOTOMIA (T o INTERPORTAL) AUMENTAN RANGO MOVILIDAD Y DISMINUYEN FUERZA DISTRACCION NECESARIA PARA DECOAPTAR LA CADERA
- CAPSULAS LAXAS (REINTERVENCION , DISPLASIA RESIDUAL, CONECTIVOPATIAS) AUMENTAN TRASLACION CABEZA FEMORAL EN FLEXION Y AUMENTAN MOVILIDAD ROTACIONAL EN PLANO CORONAL
- RELACION TAMAÑO CAPSULOTOMIA Y AUMENTO DE EFECTO (MOVILIDAD, FUERZA DISTRACCION)
- REPARACION CAPSULAR ES CAPAZ DE MEJORAR LA BIOMECANICA DE LA ARTICULACION (FUERZA DISTRACCION, ESTABILIDAD TORSIONAL, RANGO MOVILIDAD EN PLANO CORONAL)
- REPARACION COMPLETA >>>PARCIAL
- NUMERO SUTURAS QUE SERIAN NECESARIAS (NUNCA UNA SOLA)

CURRENT CONCEPTS REVIEW

Hip Joint Capsular Anatomy, Mechanics, and Surgical Management

K.C. Geoffrey Ng, PhD, Jonathan R.T. Jeffers, PhD, and Paul E. Beaulé, MD, FRCSC

Investigation performed at the Imperial College London, London, United Kingdom, and the Division of Orthopaedic Surgery, University of Ottawa, Ottawa, Ontario, Canada

- ▶ Hip joint capsular ligaments (iliofemoral, ischiofemoral, and pubofemoral) play a predominant role in functional mobility and joint stability.
- ▶ The zona orbicularis resists joint distraction (during neutral positions), and its aperture mechanism stabilizes the hip from adverse edge-loading (during extreme hip flexion-extension).
- ▶ To preserve joint function and stability, it is important to minimize capsulotomy size and avoid disrupting the zona orbicularis, preserve the femoral head size and neck length, and only repair when or as necessary without altering capsular tensions.
- ▶ It is not fully understood what the role of capsular tightness is in patients who have cam femoroacetabular impingement and if partial capsular release could be beneficial and/or therapeutic.
- ▶ During arthroplasty surgery, a femoral head implant that is nearly equivalent to the native head size with an optimal neck-length offset can optimize capsular tension and decrease dislocation risk where an intact posterior hip capsule plays a critical role in maintaining hip stability.

Hip joint capsular ligaments serve a fundamental role in balancing functional mobility and joint stability. Although the anatomy of hip capsular ligaments has been well described in the literature¹, the knowledge of its characteristics and contributions toward hip mechanics and disease processes are evolving. More importantly, how the hip capsule is managed during surgical interventions (preservation and arthroplasty) and its effects on joint function are increasingly recognized²⁻⁴. Several recent laboratory studies have provided new insights into functional mobility and stability of the hip joint that should be carefully considered during surgery⁵⁻³⁰. The purpose of this review was to provide a comprehensive summary of the

functional anatomy and material characteristics of the hip capsule and the effects of different capsular management techniques during arthroscopic and arthroplasty procedures on joint function.

Characteristics Anatomy

Human ligaments consist of predominantly type-I collagen (85%) and combinations of type III, V, VI, XI, and XIV (15%)^{31,32}. Within the hip joint, higher ratios of type-III collagen in the ligamentous capsule are associated with hip instability^{33,34}, whereas elevated levels in the cartilage are associated with

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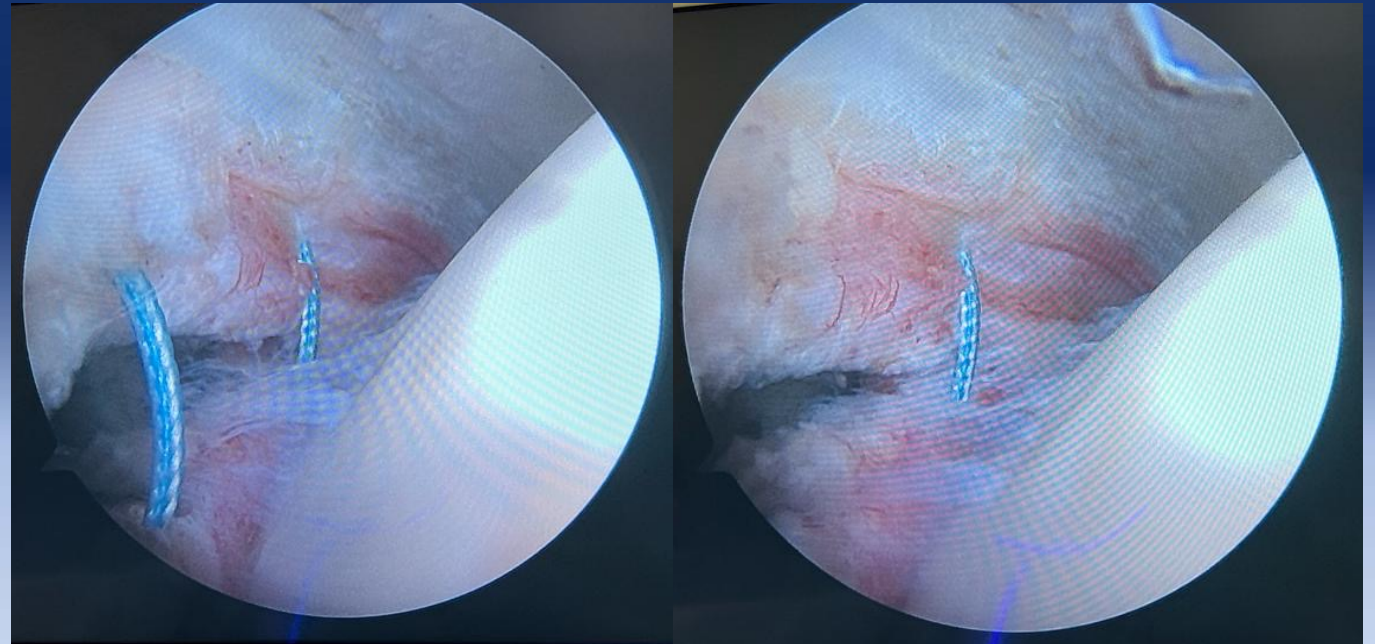
LAS CARACTERISTICAS DE LA CAPSULA NO SON SIEMPRE IGUALES VARIAN EDAD, SEXO, ESTADO DEGENERATIVO DE LA ARTICULACION

"MAS ESTABLES VARONES , EDAD MAS AVANZADA, PREARTROSICAS ...)

REPARACION>

>>>PREVENDRA POSIBILIDAD DE MICROINESTABILIDAD POSTOPERATORIA??

>>>>SE ASOCIARA CON MEJORES RESULTADOS CLINICOS??



Hip arthroscopic capsulotomy techniques and capsular management strategies: a systematic review

Neger Ekhtiar¹, Darren de Sa², Ulrike F. Hoffner³, Nicole Simonon⁴, Christopher M. Larson⁵, Marc R. Safra⁶, Haldun K. Ayral⁷

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Abstract Hip arthroscopy is increasingly used to address hip joint pathology. Intra-articular instability has been reported as a potential complication, leading to the evaluation of various capsular management strategies. The purpose of this review was to (1) report the techniques used for capsulotomy in hip arthroscopy, (2) understand techniques and indications for capsular closure, and (3) report outcomes based on capsular management strategies. Only one study found a statistically significant difference between complete and partial repair on the Hip Outcome Score-Sport Specific Subscale, though this difference was less than the minimal clinically important difference (0.6 vs 0.7).

Keywords Hip arthroscopy · Capsulotomy · Capsular repair · Instability

Introduction Hip arthroscopy is increasingly used to address hip joint pathology. Intra-articular instability has been reported as a potential complication, leading to the evaluation of various capsular management strategies. The purpose of this review was to (1) report the techniques used for capsulotomy in hip arthroscopy, (2) understand techniques and indications for capsular closure, and (3) report outcomes based on capsular management strategies.

Keywords Hip arthroscopy · Capsulotomy · Capsular repair · Instability

Prospective Randomized Comparison of Capsular Management Techniques During Hip Arthroscopy

Kostas J. Economopoulos¹ MD, Anikar Chhabra¹ MD, and Christopher Kwon³ MD

Background Capsular management during hip arthroscopy remains controversial. Studies evaluating the topic commonly rely on retrospective comparative review of data on a large series of patients.

Purpose/Hypothesis The purpose was to perform a prospective randomized trial to comparatively assess 3 commonly performed capsular management techniques. It was hypothesized that capsular closure during hip arthroscopy would result in superior outcomes when compared with unrepaired capsulotomy management techniques.

Methods Patients ($n = 160$) who had hip arthroscopy with labral repairs and femoral capsulotomy performed by the senior author traditionally, the defect has been left unrepaired; however, increasing evidence suggests that the hip contributes to postoperative pain and intra-articular capsular instability. Nevertheless, the clinical benefit of performing routine capsular repair remains controversial.

Results Patient demographics, preoperative patient-reported outcomes, and radiographic measurements were similar among all 3 groups. Revision hip arthroscopy was performed in 15.6% (9/58) in the TC group, 17.9% (10/56) in the OC group, and 16.7% (9/54) in the UO group. No patient in the TC group or none in the OC and UO groups ($P = .009$). The OC group showed higher modified Harris Hip Score (mHHS) and Hip Outcome Score-Active of Daily Living (HOS-ADL) at the 2-year follow-up when compared with the TC group ($P = .002$) and ($P = .001$), respectively. When compared with the TC group, the OC group demonstrated superior mHHS (86.2 vs 76.6, HOS-ADL 85.6 vs 76.8, and HOS-SBS (Hip Outcome Score-Sport-Specific Subscale) 74.4 vs 65.3 at the first 2-year follow-up ($P = .001$). At the 2-year follow-up, the TC group had a higher mHHS (81.7 vs 76.6, HOS-ADL 82.8 vs 76.8, and HOS-SBS (71.4 vs 68.3), $P > .001$) as compared with the TC group.

Conclusion Patients undergoing complete capsular closure during hip arthroscopy showed improved patient-reported and surgeon-reported outcomes when compared with unrepaired TC capsulotomy or repaired OC capsulotomy. These results suggest that repair after arthroscopy may be a more anatomic arthroscopic capsular management technique.

Keywords capsular closure · hip instability · hip arthroscopy · labral tear

Routine Capsular Closure With Hip Arthroscopic Surgery Results in Superior Outcomes

Austin M. Loney¹ MD, Julia A. McCann¹ MD, Patrick T. Connolly¹ BS, Spencer M. Connolly¹ MD, Andrew A. Sarraf¹ MD, and William E. Barlow¹ MD

Investigation performed at the Department of Orthopedic Surgery, Georgetown University Hospital, Washington, DC, USA

Background Hip arthroscopic surgery, capsulotomy is performed to improve visualization and allow instrumentation of the joint. Traditionally, the defect has been left unrepaired; however, increasing evidence suggests that the hip contributes to postoperative pain and intra-articular capsular instability. Nevertheless, the clinical benefit of performing routine capsular repair remains controversial.

Purpose/Hypothesis We conducted a systematic review and meta-analysis to investigate the effects of routine capsular closure on patient-reported outcome (PRO), a hypothesis that superior PROs would be observed with routine capsular closure.

Methods A meta-analysis and meta-analysis was conducted according to PRISMA (Preferred Reporting Items for Meta-Analyses) and Meta-analysis guidelines. The terms “hip,” “arthrosco-,” “capsular,” “repair,” and “closure” were used to query Cochrane MEDLINE, Embase, CENTRAL, Cochrane Central Register of Controlled Trials, CINAHL, Cumulative Index to Nursing and Allied Health Literature, SPORTDiscus, and PubMed. Articles with PROs stratified by capsular management were included. Multivariate meta-effects meta-analysis models were implemented with study-level covariates and forest effects moderators for capsule closure versus no repair and after controlling for surgical indication and prospective PROs. The effect of repair on both the postoperative score and magnitude of the benefit of capsule repair may be stratified by large prospective randomized study using PRO measure specifically tailored and validated for hip arthroscopy/preservation.

Results Of 432 initial articles, 36 were eligible for analysis, with results for 5332 hip arthroscopic procedures. The capsule was repaired in 3427 arthroscopic procedures and unrepaired in 1705. Capsular repair was associated with significantly higher patient-reported PROs (mean difference [MD], 0.55; 95% CI, 0.25–0.85; $P < .001$) and HOS (mean difference [MD], 0.87; 95% CI, 0.29–1.36; $P < .001$) scores as well as significantly greater improvement on the mHHS (mean difference [MD], 0.27; 95% CI, 0.09–0.45; $P < .003$), HOS-ADL (3.13; 95% CI, 1.31–5.05; $P = .003$), and HOS-SBS (4.06; 95% CI, 2.05–6.07; $P = .001$).

Conclusion This meta-analysis is the largest to date evaluating the effect of capsule closure on PROs and demonstrates significantly higher mean postoperative scores and significantly greater improvement with repair, with controlling for the effect of prospective score and surgical indication. The magnitude of the benefit of capsule repair may be stratified by large prospective randomized study using PRO measure specifically tailored and validated for hip arthroscopy/preservation.

Keywords hip arthroscopic surgery · hip capsule · capsular repair · outcomes · systematic review · meta-analysis

Capsular Repair May Improve Outcomes in Patients Undergoing Hip Arthroscopy for Femoroacetabular Impingement: A Systematic Review of Comparative Outcome Studies

Jade S. Owens, B.S., Andrew E. Jimenez, M.D., Jacob Shapiro, M.D., Benjamin R. Saks, M.D., Rachel M. Glenn, B.S., David R. Malhotra, M.D., Han K. Anken, M.D., Payal S. Sabherwal, M.D., Y. Lail, M.D., M.S., and Benjamin G. Domb, M.D.

Systematic Review

Purpose To review the existing literature in order to determine the effect of hip capsule repair on outcomes after hip arthroscopy for femoroacetabular impingement syndrome. **Methods** This study used Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines to find articles by using PubMed and Embase. Included studies were Level I through III studies that focused on patient outcomes as a function of hip capsular treatment: capsulotomy repair, partial repair, and unrepaired capsulotomy. The Methodological Index for Non-Randomized Studies was used for quality assurance of clinical outcome studies. After applying inclusion and exclusion criteria, a total of 11 comparative outcome studies evaluating 2,916 hips were included; they evaluated the following capsular management techniques: complete repair ($n = 1,112$; 37.7%), partial repair ($n = 52$; 1.7%), capsulotomy ($n = 221$; 7.4%), and unrepaired capsulotomy ($n = 1,429$; 48.5%). **Results** Of the 16 studies, 13 included patient-reported outcome scores (PROs). 3 included imaging outcomes data, and 1 included reporting on the operation. Of the 10 directly compared repair outcomes between a hip capsule repair group and an unrepaired group, 8 of the 10 studies that directly compared PROs between a group with unrepaired capsulotomy and a group with capsule repair. 8 studies demonstrated statistically significantly better PROs in the repaired group compared to the unrepaired group, and 2 studies found no difference between the two groups. Response rates between the demonstrated results between groups, and an influence was found to be imaging outcomes.

Conclusion Technical details regarding capsulotomy and capsular management post hip arthroscopy are not consistently reported in the literature. Capsulotomy are most often performed using an interportal technique, and most recent studies report routine closure. Overall, post-operative instability is rare and there is no consistent trend for capsule management strategy. Given current evidence, there is little basis on which to establish the relationship between surgical technique and post-operative instability on long-term consequences (i.e., kinematic changes). Thus, hip capsule reconstruction may be suitable for specific populations (i.e., dysplasia or laxity), evidence-based indications for capsule repair remain unclear.

Level of evidence Level IV, systematic review of level I–IV studies.

Keywords Hip arthroscopy · Capsulotomy · Capsular repair · Instability

Effect of Capsular Closure After Hip Arthroscopy for Femoroacetabular Impingement Syndrome on Achieving Clinically Meaningful Outcomes

A Meta-analysis of Prospective and Comparative Studies

Kyle N. Kurza¹ MD, Amir Vadhera² BS, Anvita Devlinny³ BS, Benedict U. Nwachukwu⁴ MD, MBA, Bryan T. Kelly⁵ MD, MBA, Shane J. Nho⁶ MD, MS, and Jorge Chhabra¹ MD, PhD

Investigation performed at the Hospital for Special Surgery, New York, New York, USA

Background Recent literature has demonstrated conflicting evidence as to whether capsular closure after hip arthroscopy for femoroacetabular impingement syndrome (FAIS) results in superior outcomes compared with capsulotomy without repair. Additionally, these studies have not explored the effect of capsular management on clinically significant outcomes improvement.

Purpose To perform a meta-analysis of prospective and comparative studies to determine whether capsular management influences the rate of clinically significant outcomes improvement after hip arthroscopy for FAIS.

Methods PubMed, OVID Medline, Embase, and Cochrane databases were queried in September 2016 for studies with evidence levels I to III that directly compared capsular management (closure) and reported rates of achieving the minimal clinically important difference (MCID) at a minimum follow-up of 2 years. Studies of level I evidence that noted not describing or directly comparing capsular management techniques as well as those not reporting the MCID were excluded. Methodological quality was assessed using the methodological index for nonrandomized studies for Meta-Analytical Evidence. Forest plots were constructed to quantitatively evaluate the association between capsular management and achievement of the MCID by generating effect estimates in the form of relative risk (RR) with 95% CI.

Results A total of 10 studies with 1611 patients were included. The overall pooled rates of MCID achievement for the modified Harris Hip Score (mHHS), Hip Outcome Score-Active of Daily Living (HOS-ADL), and HOS-SBS (Hip Outcome Score-Sport-Specific Subscale) were 84.4%, 83.3%, and 83.8%, respectively, at a mean follow-up of 40.3 months. Capsular closure at 1.07–1.10 ($P = .001$) and trend toward statistical significance for the HOS-ADL (RR, 1.11; 95% CI, 1.01–1.24; $P = .029$) and HOS-SBS (RR, 1.06; 95% CI, 0.96–1.17; $P = .04$).

Conclusion Although capsular closure appeared to result in higher rates of clinically significant outcome improvement in hip function, there was no definitive increased likelihood of achieving statistically significant improvement in relevant hip outcome scores with capsular closure.

Keywords hip arthroscopy; femoroacetabular impingement syndrome; capsule; closure; repair; MCID; clinically significant outcome

The Role of Comprehensive Capsular Management in Hip Arthroscopy for the Treatment of Femoroacetabular Impingement Syndrome

Edward C. Beck, M.D., M.P.H., Sunikom Suppakorn, M.D., and Shane J. Nho, M.D., M.S.

Abstract Advances in the understanding of femoroacetabular impingement syndrome and advancements in hip arthroscopic techniques, including chondrolabral preservation and labral repair, have led to improved outcomes for patients with femoroacetabular impingement syndrome. Capsulotomy and capsular repair have been used to improve outcomes both attributed to the increased awareness of performing capsular closure after addressing intra-articular hip pathology, to preserve the biomechanical properties of the hip. A number of biomechanical studies have demonstrated that the Iliofemoral Ligament is a critical component of hip biomechanics, providing stability and limiting passive translation, distraction, and rotation within the normal range of hip motion. The intra-articular T-junction capsule may be most commonly used method for accessing intra-articular pathology; both techniques require transection of the Iliofemoral Ligament perpendicular to its fibers, which may lead to micro- and macroinstability if left unrepaired at the end of the procedure.

Introduction The hip capsule is composed of a complex of external and internal ligaments which provide inherent stability and allow for complex biomechanical movements. Arthroscopic hip preservation surgery for impingement syndromes (FAIS) is a procedure with a high learning curve, requiring manipulation of multiple anatomic structures. Including the hip capsule in order to address biomechanical stability [14]. A number of studies have been described to obtain adequate working space during hip arthroscopy, including ipsilateral incisions, interportal capsulotomy, and T-junction capsule [14]. Although performing a capsulotomy allows the hip arthroscopist a wide surgical view and working space, it results in an increase in hip instability [14]. A number of studies have reported similar success rates when performing hip arthroscopy with or without capsular closure; however, limited research exists on the present widespread application. Thus, there still is a need to evaluate the performance of a capsulotomy without subsequent complete capsular repair.

Capsular Management in Hip Arthroscopy: Biomechanical, and Technical Review

Benjamin D. Kuhns¹, Alexander E. Weber², David M. Levy³, Ashesh Bedal⁴, Raymond C. Mattar⁵, Michael J. Scahill⁶, and Shane J. Nho¹

Abstract Advances in the understanding of femoroacetabular impingement syndrome and advancements in hip arthroscopic techniques, including chondrolabral preservation and labral repair, have led to improved outcomes for patients with femoroacetabular impingement syndrome. Capsulotomy and capsular repair have been used to improve outcomes both attributed to the increased awareness of performing capsular closure after addressing intra-articular hip pathology, to preserve the biomechanical properties of the hip. A number of biomechanical studies have demonstrated that the Iliofemoral Ligament is a critical component of hip biomechanics, providing stability and limiting passive translation, distraction, and rotation within the normal range of hip motion. The intra-articular T-junction capsule may be most commonly used method for accessing intra-articular pathology; both techniques require transection of the Iliofemoral Ligament perpendicular to its fibers, which may lead to micro- and macroinstability if left unrepaired at the end of the procedure.

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Keywords hip arthroscopy; hip capsule; hip instability; hip joint; capsulotomy techniques; capsular repair

Background Recent literature has demonstrated conflicting evidence as to whether capsular closure after hip arthroscopy for femoroacetabular impingement syndrome (FAIS) results in superior outcomes compared with capsulotomy without repair. Additionally, these studies have not explored the effect of capsular management on clinically significant outcomes improvement.

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Conclusion Although capsular closure appeared to result in higher rates of clinically significant outcome improvement in hip function, there was no definitive increased likelihood of achieving statistically significant improvement in relevant hip outcome scores with capsular closure.

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Methods PubMed, MEDLINE, EMBASE, and PubMed were searched and screened in duplicate for relevant studies. Data regarding patient demographics, indications, surgical technique, rehabilitation strategies, and complication rates were obtained. Study quality was assessed in duplicate using the Methodological Index for Non-Randomized Studies (MENDIS) criteria.

Results Eighty-two studies of primarily level IV evidence (80%) and of fair quality involving 4534 patients with a mean age of 43 years (range 12–82 years) were included. Fifty percent of patients were male. Mean follow-up was 32 months (range 1–119 months).

Conclusion Technical details regarding capsulotomy and capsular management post hip arthroscopy are not consistently reported in the literature. Capsulotomy are most often performed using an interportal technique, and most recent studies report routine closure. Overall, post-operative instability is rare and there is no consistent trend for capsule management strategy. Given current evidence, there is little basis on which to establish the relationship between surgical technique and post-operative instability on long-term consequences (i.e., kinematic changes). Thus, hip capsule reconstruction may be suitable for specific populations (i.e., dysplasia or laxity), evidence-based indications for capsule repair remain unclear.

Level of evidence Level IV, systematic review of level I–IV studies.

Keywords Hip arthroscopy · Capsulotomy · Capsular repair · Instability

Hip arthroscopic capsulotomy techniques and capsular management strategies: a systematic review

Neger Ekhtiar¹, Darren de Sa², Ulrike F. Hoffner³, Nicole Simonon⁴, Christopher M. Larson⁵, Marc R. Safra⁶, Haldun K. Ayral⁷

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Abstract Hip arthroscopy is increasingly used to address hip joint pathology. Intra-articular instability has been reported as a potential complication, leading to the evaluation of various capsular management strategies. The purpose of this review was to (1) report the techniques used for capsulotomy in hip arthroscopy, (2) understand techniques and indications for capsular closure, and (3) report outcomes based on capsular management strategies. Only one study found a statistically significant difference between complete and partial repair on the Hip Outcome Score-Sport Specific Subscale, though this difference was less than the minimal clinically important difference (0.6 vs 0.7).

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Capsular Management in Hip Arthroscopy

Joshua D. Harris, MD¹

Abstract Advances in the understanding of femoroacetabular impingement syndrome and advancements in hip arthroscopic techniques, including chondrolabral preservation and labral repair, have led to improved outcomes for patients with femoroacetabular impingement syndrome. Capsulotomy and capsular repair have been used to improve outcomes both attributed to the increased awareness of performing capsular closure after addressing intra-articular hip pathology, to preserve the biomechanical properties of the hip. A number of biomechanical studies have demonstrated that the Iliofemoral Ligament is a critical component of hip biomechanics, providing stability and limiting passive translation, distraction, and rotation within the normal range of hip motion. The intra-articular T-junction capsule may be most commonly used method for accessing intra-articular pathology; both techniques require transection of the Iliofemoral Ligament perpendicular to its fibers, which may lead to micro- and macroinstability if left unrepaired at the end of the procedure.

Introduction The hip capsule is composed of a complex of external and internal ligaments which provide inherent stability and allow for complex biomechanical movements. Arthroscopic hip preservation surgery for impingement syndromes (FAIS) is a procedure with a high learning curve, requiring manipulation of multiple anatomic structures. Including the hip capsule in order to address biomechanical stability [14]. A number of studies have been described to obtain adequate working space during hip arthroscopy, including ipsilateral incisions, interportal capsulotomy, and T-junction capsule [14]. Although performing a capsulotomy allows the hip arthroscopist a wide surgical view and working space, it results in an increase in hip instability [14]. A number of studies have reported similar success rates when performing hip arthroscopy with or without capsular closure; however, limited research exists on the present widespread application. Thus, there still is a need to evaluate the performance of a capsulotomy without subsequent complete capsular repair.

Keywords hip arthroscopy; hip capsule; hip instability; hip joint; capsulotomy techniques; capsular repair

Background Recent literature has demonstrated conflicting evidence as to whether capsular closure after hip arthroscopy for femoroacetabular impingement syndrome (FAIS) results in superior outcomes compared with capsulotomy without repair. Additionally, these studies have not explored the effect of capsular management on clinically significant outcomes improvement.

Purpose To perform a meta-analysis of prospective and comparative studies to determine whether capsular management influences the rate of clinically significant outcomes improvement after hip arthroscopy for FAIS.

Methods PubMed, OVID Medline, Embase, and Cochrane databases were queried in September 2016 for studies with evidence levels I to III that directly compared capsular management (closure) and reported rates of achieving the minimal clinically important difference (MCID) at a minimum follow-up of 2 years. Studies of level I evidence that noted not describing or directly comparing capsular management techniques as well as those not reporting the MCID were excluded. Methodological quality was assessed using the methodological index for nonrandomized studies for Meta-Analytical Evidence. Forest plots were constructed to quantitatively evaluate the association between capsular management and achievement of the MCID by generating effect estimates in the form of relative risk (RR) with 95% CI.

Results A total of 10 studies with 1611 patients were included. The overall pooled rates of MCID achievement for the modified Harris Hip Score (mHHS), Hip Outcome Score-Active of Daily Living (HOS-ADL), and HOS-SBS (Hip Outcome Score-Sport-Specific Subscale) were 84.4%, 83.3%, and 83.8%, respectively, at a mean follow-up of 40.3 months. Capsular closure at 1.07–1.10 ($P = .001$) and trend toward statistical significance for the HOS-ADL (RR, 1.11; 95% CI, 1.01–1.24; $P = .029$) and HOS-SBS (RR, 1.06; 95% CI, 0.96–1.17; $P = .04$).

Conclusion Although capsular closure appeared to result in higher rates of clinically significant outcome improvement in hip function, there was no definitive increased likelihood of achieving statistically significant improvement in relevant hip outcome scores with capsular closure.

Keywords hip arthroscopy; femoroacetabular impingement syndrome; capsule; closure; repair; MCID; clinically significant outcome

Introduction Hip arthroscopy is increasingly used to address hip joint pathology. Intra-articular instability has been reported as a potential complication, leading to the evaluation of various capsular management strategies. The purpose of this review was to (1) report the techniques used for capsulotomy in hip arthroscopy, (2) understand techniques and indications for capsular closure, and (3) report outcomes based on capsular management strategies.

Methods PubMed, MEDLINE, EMBASE, and PubMed were searched and screened in duplicate for relevant studies. Data regarding patient demographics, indications, surgical technique, rehabilitation strategies, and complication rates were obtained. Study quality was assessed in duplicate using the Methodological Index for Non-Randomized Studies (MENDIS) criteria.

Results Eighty-two studies of primarily level IV evidence (80%) and of fair quality involving 4534 patients with a mean age of 43 years (range 12–82 years) were included. Fifty percent of patients were male. Mean follow-up was 32 months (range 1–119 months).

Conclusion Technical details regarding capsulotomy and capsular management post hip arthroscopy are not consistently reported in the literature. Capsulotomy are most often performed using an interportal technique, and most recent studies report routine closure. Overall, post-operative instability is rare and there is no consistent trend for capsule management strategy. Given current evidence, there is little basis on which to establish the relationship between surgical technique and post-operative instability on long-term consequences (i.e., kinematic changes). Thus, hip capsule reconstruction may be suitable for specific populations (i.e., dysplasia or laxity), evidence-based indications for capsule repair remain unclear.

Level of evidence Level IV, systematic review of level I–IV studies.

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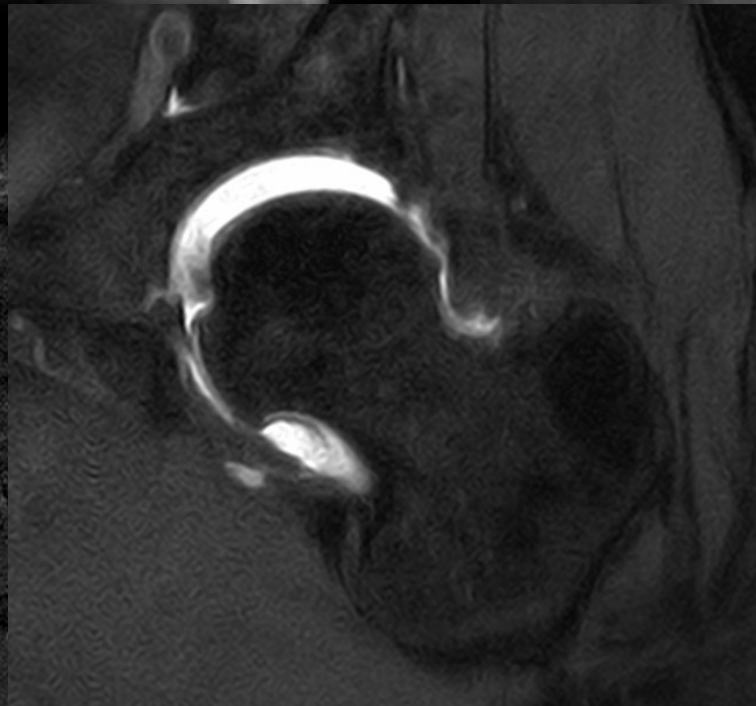
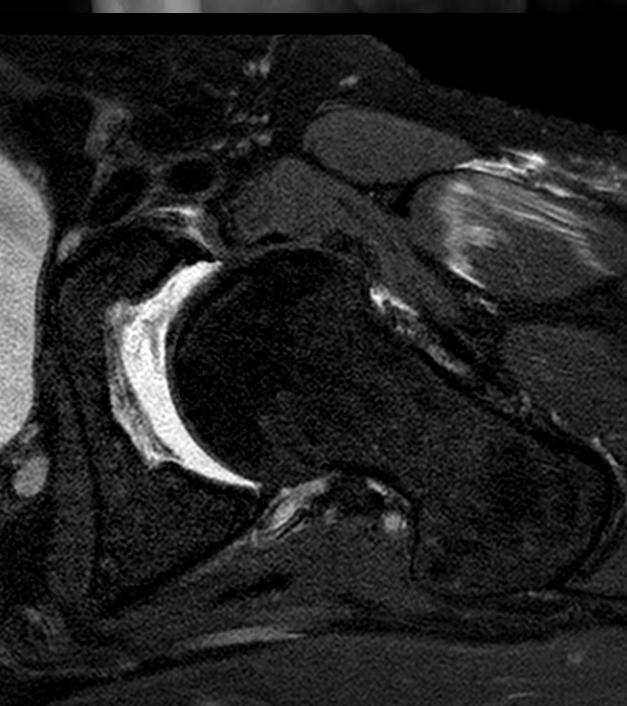
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ESTUDIOS CLINICOS

- *Owen et al . Arthroscopy 2021*
 - (revisión sistemática 16 estudiosT, casi 3000 pacientes , 1116 capsulotomias interportal sin cerrar y 178 en T. Resto cierre completo)
 - 10 estudios comparación directa (8 Reparar cápsula tiene mejores resultados en escalas de valoración)
 - SUGIEREN MEJOR RESULTADO CON CIERRE CAPSULAR
- *Looney et al. Am J Sports Med 2021*
 - Revisión sistemática + Metaanálisis, 36 estudios, 5132 caderas, Reparación 3427
 - Metodología especial (control puntuación precx y de la indicación quirúrgica)
 - RESULTADOS SIGNIFICATIVAMENTE MEJORES EN REPARACION CAPSULAR
- RELACION CON MEJORES RESULTADOS EN ESCALAS DE VALORACION “...tendencia a significación estadística...”
- MENORES TASAS DE REVISION Y DE CONVERSION A PTC
- CASI SIEMPRE CAPSULOTOMIA INTERPORTAL (DAÑARIA MENOS LA CAPSULA QUE LA T”)
- MEJOR CIERRE COMPLETO QUE CIERRE PARCIAL
- NINGUN ARTICULO TIENE MEJORES RESULTADOS EN GRUPOS DE NO REPARACION CAPSULAR



VARON 48 AÑOS. 11 AÑOS POST CAC IZDA
CE 27,8 °

2 ANCLAJES LABRUM

LESION CONDRA ACETABULAR

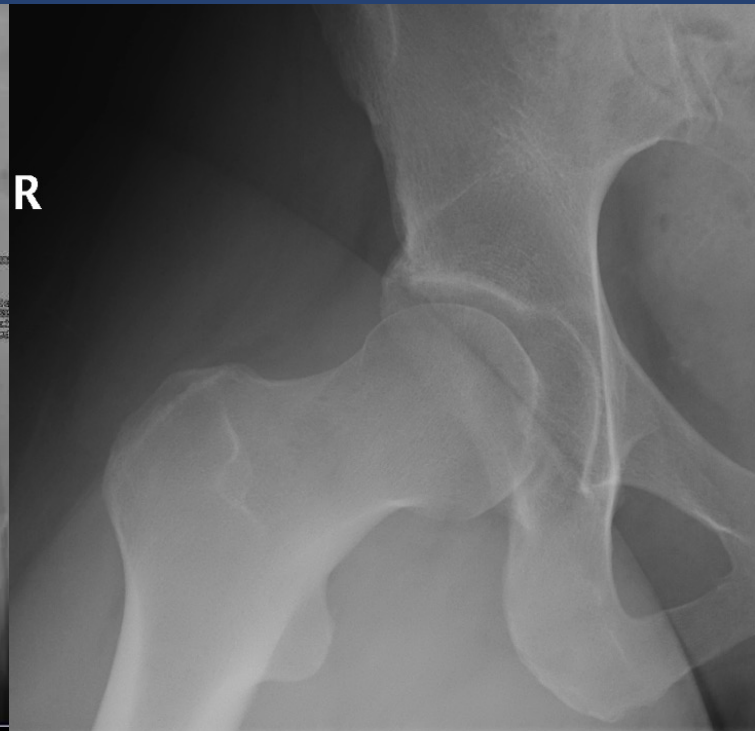
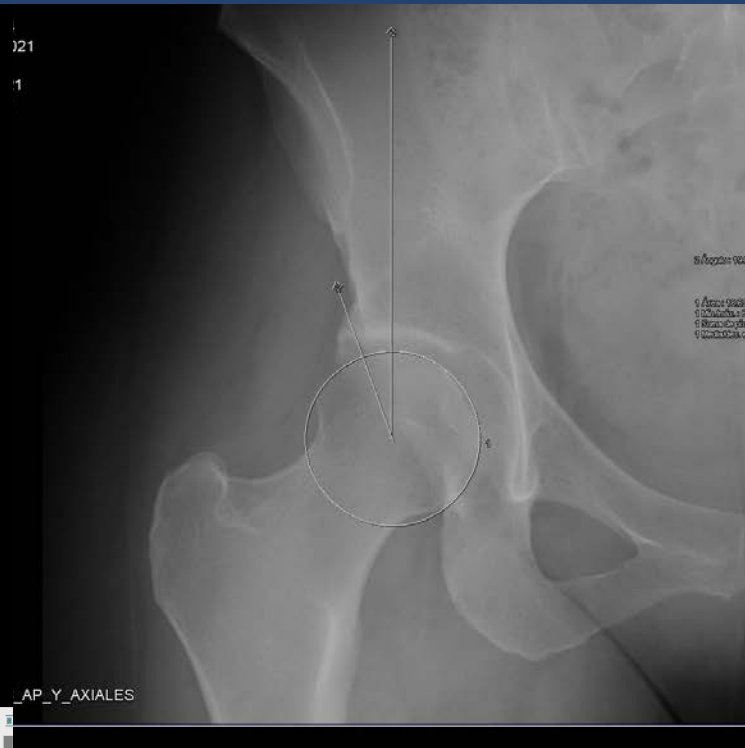
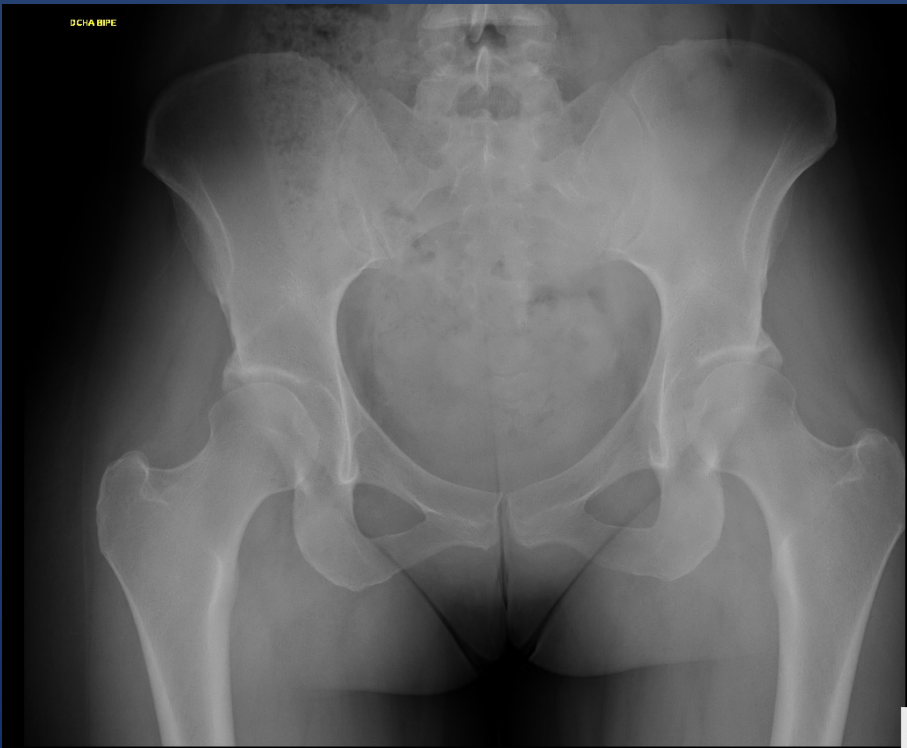
FEMOROPLASTIA

CAPSULOTOMIA NO REPARADA

RNM CONTROL

DEFECTO CAPSULAR ANTERIOR

EXCESO LAXITUD EN TRACCION + TRASLACION

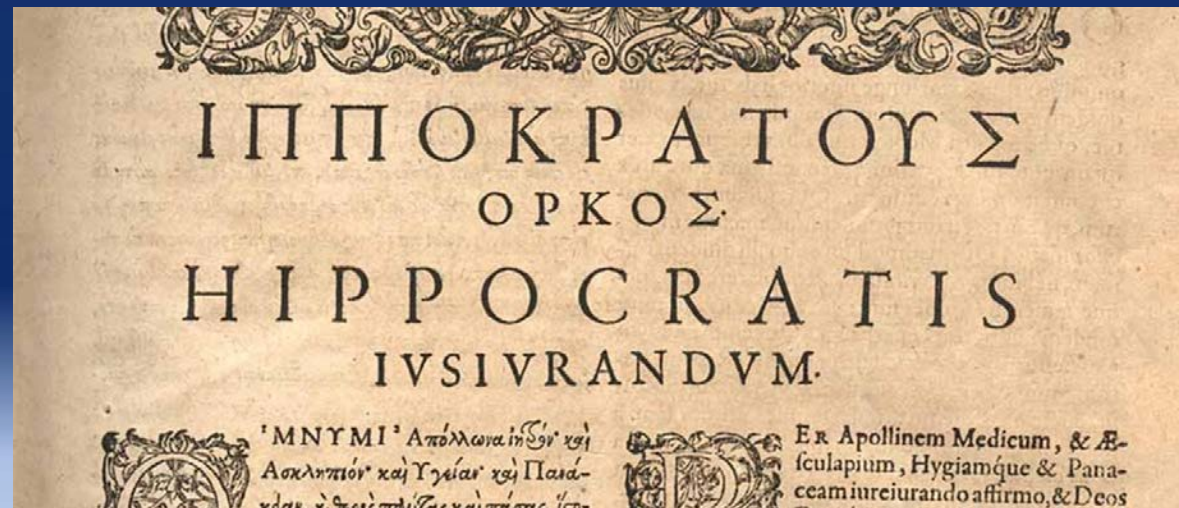


MUJER 37 AÑOS . CE 20º.
3 AÑOS Y MEDIO CADERA DERECHA POST.
REPARACION LABRUM 3 ARPONES
FEMOROPLASTIA
CAPSULOTOMIA EN T
CIERRE CAPSULAR COMPLETO 5 PTOS

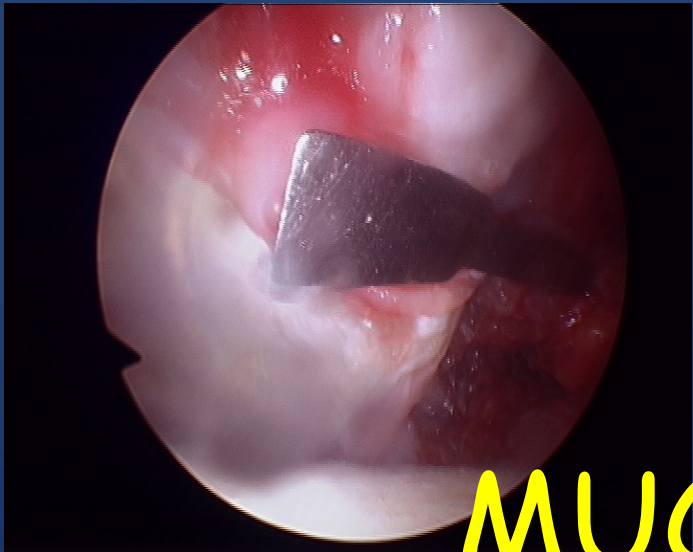
RNM CONTROL EN TRACCION + CONTRASTE

CONCLUSIONES. CAPSULA MEJOR CERRADITA

- "CERRAR AÑADE COMPLEJIDAD A UNA CIRUGIA , YA DE POR SI "INCOMODA", PERO ES REALIZABLE TECNICAMENTE Y ES SEGURA
- DESDE PTO VISTA BIOMECANICO ES EFECTIVA EN RESTAURAR LAS PROPIEDADES DEL LIGAMENTO ILIOFEMORAL
- PARECE MEJORAR RESULTADOS CLINICOS (GRAN HETEROGENICIDAD DE LOS GRUPOS PUEDE AFECTAR A LOS RESULTADOS >>>> SEXO, CAMBIOS DEGENERATIVOS, TIPO CAPSULOTOMIA, TIPO DE REPARACION , LESIONES ASOCIADAS ETC.....)
- MENORES TASAS DE CX DE REVISION Y DE CONVERSION A PTC

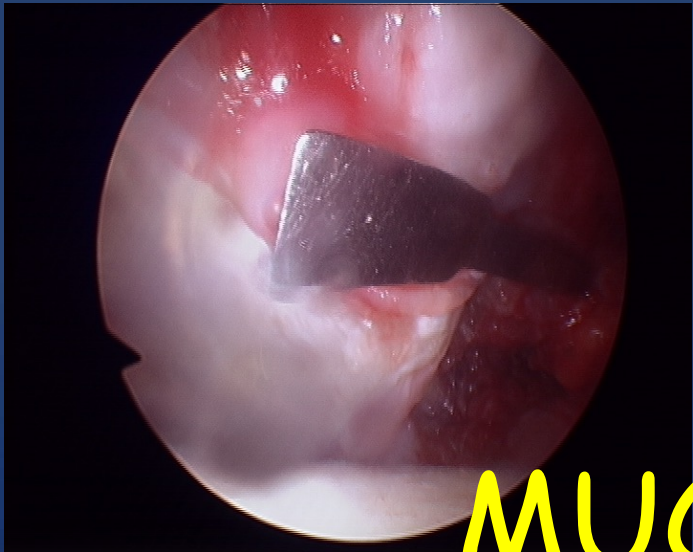


- **NUNCA vs SIEMPRE "CERRAR" >>FACTORES INFLUIR EN MICROINESTABILIDAD POSTCIRUGIA**



MUCHAS GRACIAS
POR SU ATENCION





MUCHAS GRACIAS
POR SU ATENCION



INTRODUCCION. DDC

- Disminución en volumen del acetábulo genera cizalladura en unión condrolabral, causando su lesión.
- La DDC es una causa principal de generación de lesiones labrales y condrales (> 65%)
- DDC causa principal de desarrollo de Artrosis de cadera



Ross et al. Arthroscopic disease classification and interventions as an adjunct in the treatment of acetabular dysplasia. Am J Sports Med 2011

INTRODUCCION. DDC

- Tratamiento de DDC clásicamente ha incluido la corrección de la deformidad ósea (pélvica o femoral), prestando POCA atención a las lesiones articulares.
- Resultados > 60 % supervivencia a 20 años

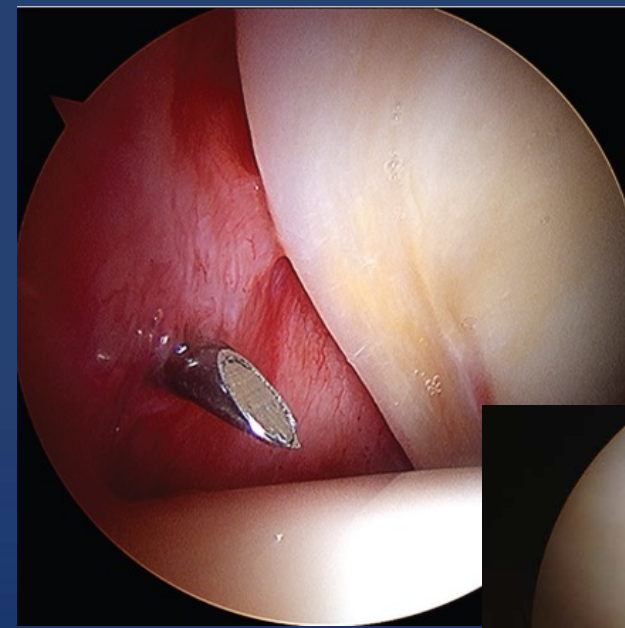


*Steppacher , Tannast, Ganz. Mean 20-year follow up of Bernese periacetabular osteotomy.
Clin Orthop Rel Res 2008*

INTRODUCCION. CAC

- Aumento x 18 en número de artroscopias de cadera en última década
- Amplia
 - Indicaciones en lesiones intra y extraarticulares (lesiones labrales, condrales, espacio trocantérico, ciático etc...)
 - Tx quirúrgicas
- INDICACIÓN Y Resultados consistentes en tratamiento PFA vs RESULTADOS

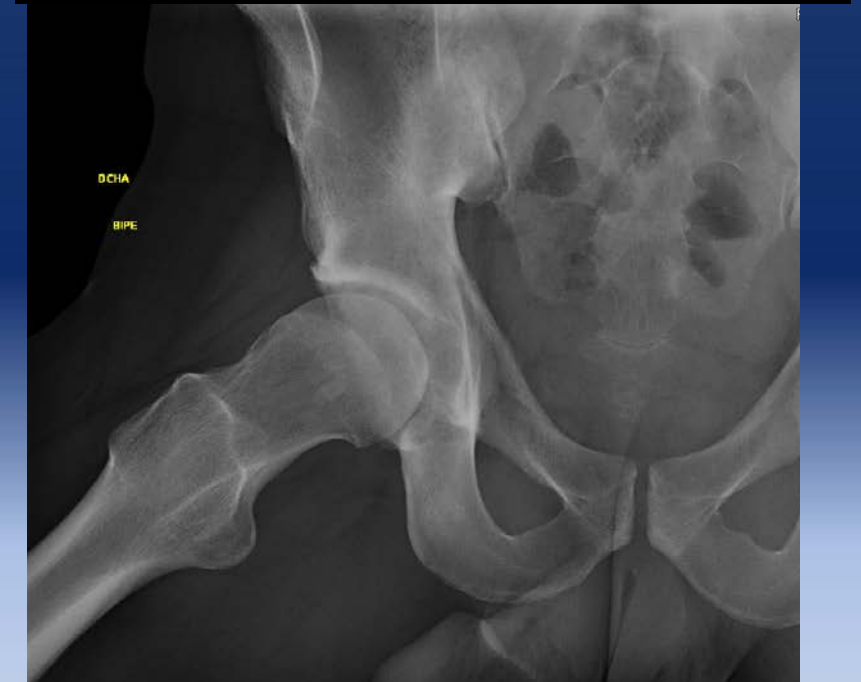
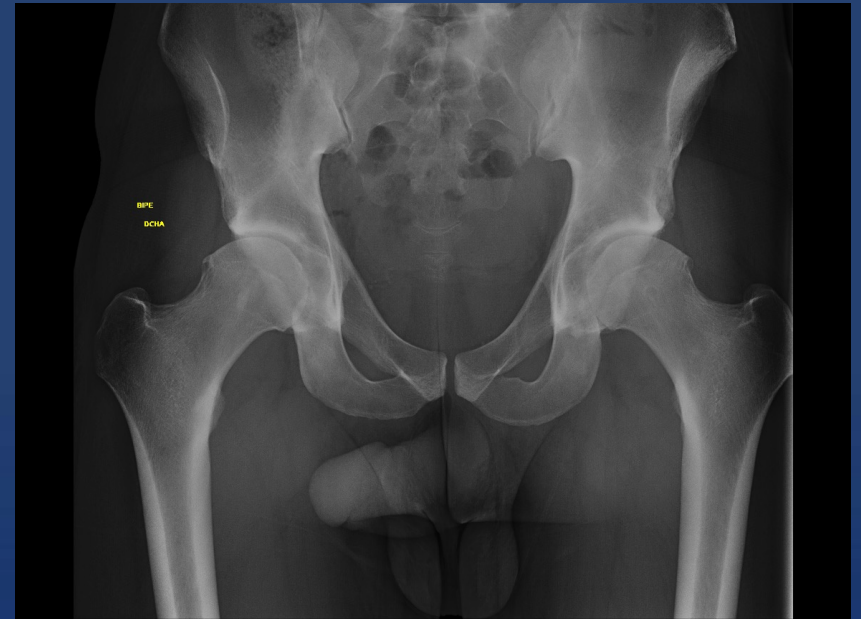
CONTROVERTIDOS EN DDC



INTRODUCCION. DDC-PFA

- La asociación existente entre PFA y CAC (>40%) introduce otro factor de confusión a la hora de decidir cual es el tratamiento más adecuado para ese paciente
 - INESTABILIDAD >>>PAO
 - CHOQUE >>>>CAC

Ida et a Prevalence and characteristics of CAM-type femoroacetabular deformity in 100 hips with symptomatic acetabular dysplasia: a case control study. J Orthop Surg Res 2014



INTRODUCCION. CAC-DDC

ALERTAN POSIBILIDAD DE MALOS RESULTADOS EN ESTE GRUPO DE PACIENTES

- Inestabilidad (luxación franca, lateralización cabeza femoral..)
- Progresión de la artrosis
- Persistencia de la sintomatología dolorosa

Parvizi et al. Arthroscopy for labral tears in patients with DDH. A cautionary note. J. Arthroplasty 2009

Matsuda et al. Rapidly progressive osteoarthritis after arthroscopic labral repair in patients with DDH. Arthroscopy 2012

CAC . diciembre 2011 . 54 AÑOS.

- Lesión labral con desinserción completa y extensión a cartílago entre las 10 y las 2.
- Exposición de hueso subcondral acetabular . **LESION IV , rotura parcial lig redondo**- sinovitis de fosa acetabular.
- Reinserción del labrum con 3 anclajes tipo push-lock, micro-perforaciones
- Sinovectomía fosa acetabular. **No cierre capsular.**



En que condiciones realizar cx artroscópica de cadera en paciente con displasia puede tener un resultado satisfactorio.....si es que puede

PAPEL ACTUAL CAC EN DDC???

- COMPLEMENTO A LA CX OSEA (PAO)
- TRATAMIENTO UNICO DDC LIMITE

Nepple et al. The dysplastic and Unstable hip: A responsible Balance of Arthroscopic and Open Approaches. Sports Med Arthrosc Rev 2015

COMPLEMENTO PAO

- Permite valoración y tratamiento de las lesiones ARTICULARES existentes
- "Concepto artroscopia rodilla-osteotomía valgizante del genu varo
- Mejora resultados?
- Dificulta la realización de la PAO?
- Aumenta número de complicaciones ??

Jackson TJ. Editorial commentary: Hip Arthroscopy with concomitant PAO: teamwork makes this dream work. Arthroscopy Mar 2019

Maldonado et al . Outcomes of Hip Arthroscopy with concomitant PAO, minimum 5 year follow up. Arthroscopy Mar 2019

COMPLEMENTO PAO. MEJORA RESULTADOS ?.COMPLICACIONES

- *Domb et al. Concomitant Hip Arthroscopy and Periacetabular Osteotomy. Arthroscopy 2015*
 - 17 pac.
 - 2,4 años
 - Resultados favorables
- *Sabbag et al . The addition of Hip Arthroscopy to Periacetabular Osteotomy Does not Increase Complication rate: a prospective case - series. Am J sports Med 2019 . Mar*
 - 248 caderas en 240 pacientes con CAC + PAO
 - 3 años (1-8)
 - 7 complicaciones grado III (Dindo-Clavien)>>>>3%
 - 3 infecciones
 - 1 dehiscencia herida
 - 1 hematoma
 - 1 osificación heterotópica
 - 1 TVP
 - 13 Re-CX (5%)

COMPLEMENTO PAO.

- *Adler et al. The utility of Hip arthroscopy in the setting of acetabular displasia: a systematic review. Arthroscopy 2019*
 - *Evidencia insuficiente para concluir que CAC añadida a la PAO produce mejores resultados clínicos que PAO aislada*
 - *Evidencia insuficiente para concluir que CAC fallida comprometa el resultado último en caso de que PAO sea necesaria*

TRATAMIENTO UNICO DISPLASIA LIMITE CADERA

SELECCIÓN ADECUADA DEL PACIENTE
(ELEGIR BIEN)

- CRITERIOS CLINICOS
- CRITERIOS RADIOLOGICOS
- TECNICA QUIRURGICA
- SI FALLA >>>>>>COMPROMETE RESULTADOS DE PAO??



Kain et al. Periacetabular Osteotomy after failed hip Arthroscopy for labral Tears in patients with acetabular Dysplasia . JBJS A 2011

TRATAMIENTO UNICO DDC LIMITE. CRITERIOS CLINICOS

- EDAD < 35 AÑOS
- IMC < 25
- EXPLORACION CLINICA
 - MANIOBRAS PINZAMIENTO +
 - MANIOBRAS DE INESTABILIDAD EN EXTENSION Y ROT EXTERNA -
 - LIMITACION DE LA ROTACION INTERNA

Domb et al. Arthroscopic capsular plication and labral preservation in borderline hip displasia: 2 years outcome of a surgical approach to a challenging problema . Am J Sports Med 2103

Uchida et al. Clinical and radiological predictors for worsened otucomes after hip arthroscopic labral preservation and capsular closure in DDH. Am J Sports Med 2016

TRATAMIENTO UNICO DDC LIMITE. CRITERIOS RADIOLOGICOS

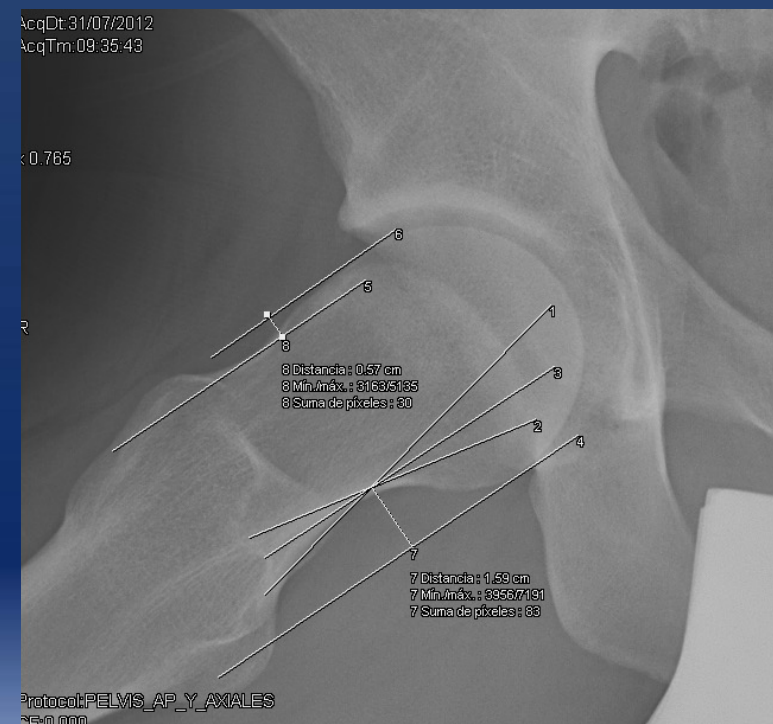
- CE 18-25°
- IA < 20°
- ROTURA LINEA SHENTON
- FEAR Index
- Tönnis O-I
- LESIONES CONDRALES EN RNM



ASOCIACION DISPLASIA CADERA- DEFORMIDAD CAM



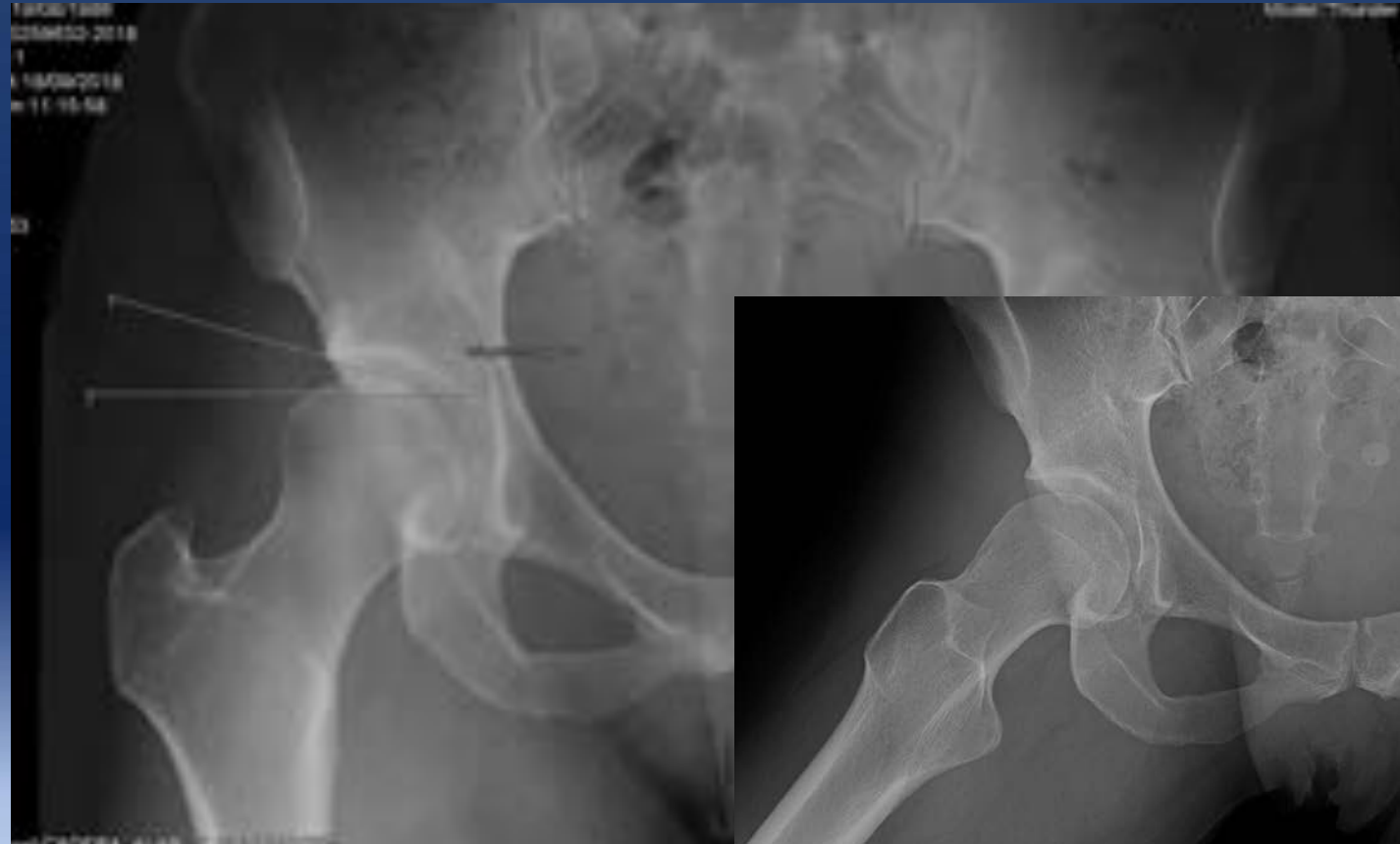
ANGULO ALFA < 50°



OFSET CERVICOCEFALICO < 7 mm

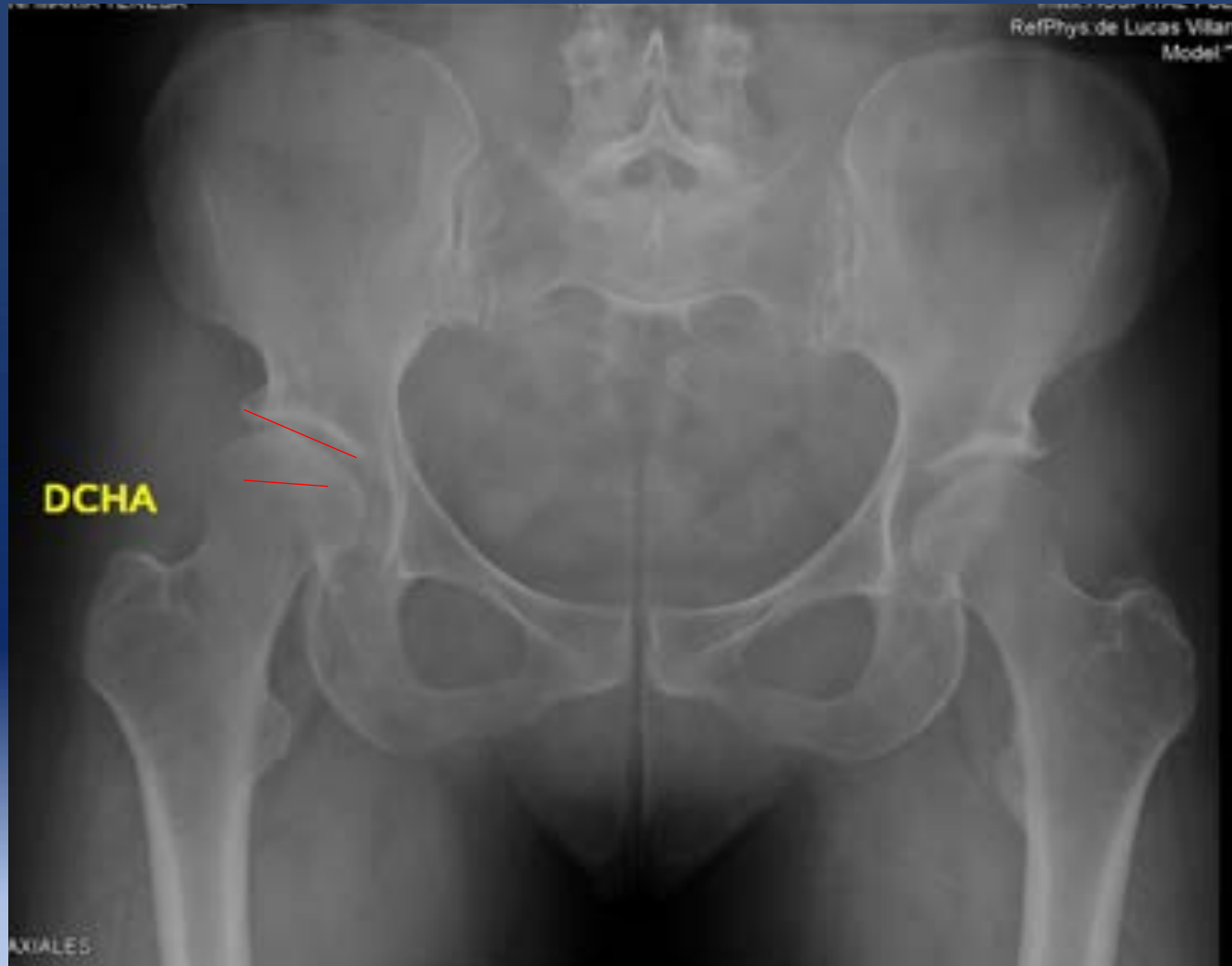
TRATAMIENTO UNICO DDC LIMITE. CRITERIOS RADIOLOGICOS

- CE 18-25°
- IA < 20°
- ROTURA LINEA SHENTON
- FEAR Index
- Tönnis O-I



FEMORO-EPIPHYSEAL ACETABULAR ROOF (FEAR) INDEX < 5°

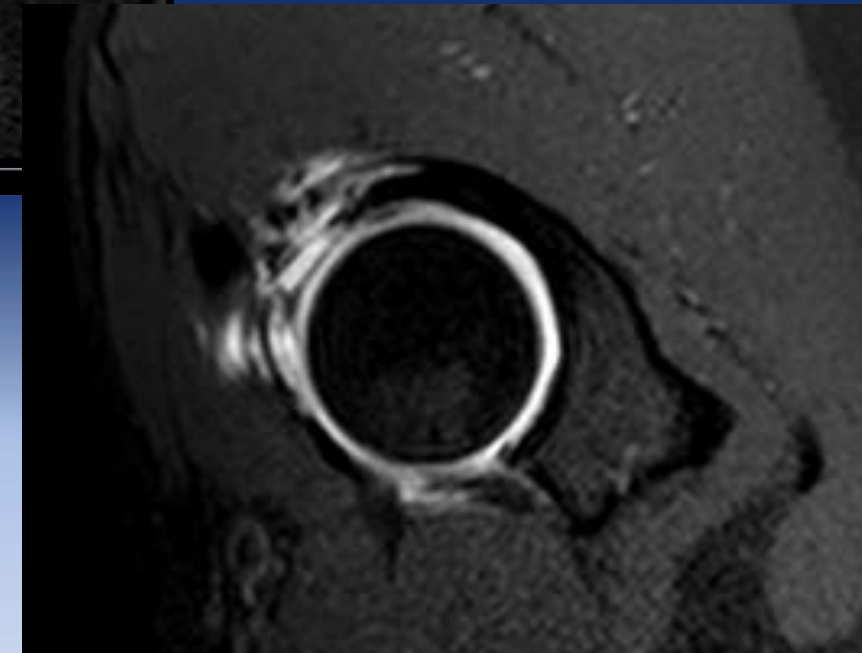
Wyatt et al, *The FEAR Index: A new measurement asociated with Instability in Borderline Hip Displasia. Clin Orthop Rel Res 2016*



INESTABLE vs ESTABLE EN CADERAS LIMITE

TRATAMIENTO UNICO DDC LIMITE. CRITERIOS RADIOLOGICOS

- CE 18-25°
- IA < 20°
- ROTURA LINEA SHENTON
- FEAR Index
- Tönnis O-I
- LESIONES CONDRALES EN RNM
 - Artrornm
 - dGEMRIC



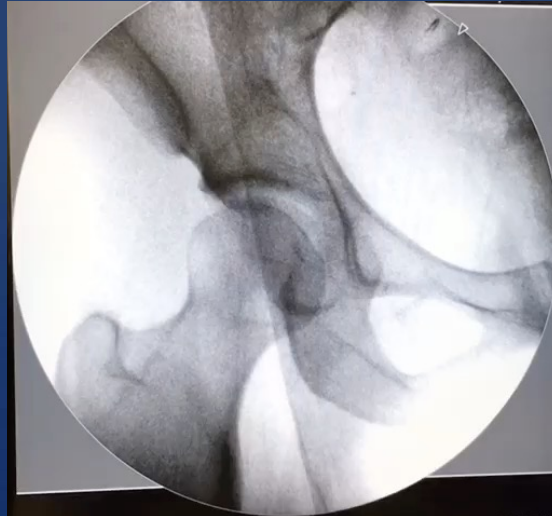
TRATAMIENTO ARTROSCOPICO DE DDC LIMITE

- TECNICA IGUAL QUE EN PFA NORMAL
 - REPARACION LABRUM Y RECUPERACION EFECTO SELLADO
 - FRESADO ACETABULAR ES MINIMO
 - CIERRE (vs PLICATURA) CAPSULAR>>>>DEJAR TEJIDO PARA PODER HACERLO

Domb et al. Arthroscopic capsular plication and labral preservation in borderline hip dysplasia: 2 years outcome of a surgical approach to a challenging problema . Am J Sports Med 2103

Larson et al: Arthroscopic management of dysplastic hip deformities: predictors of success and failures with comparison to an arthroscopic FAI cohort. Am J Sports Med 2016

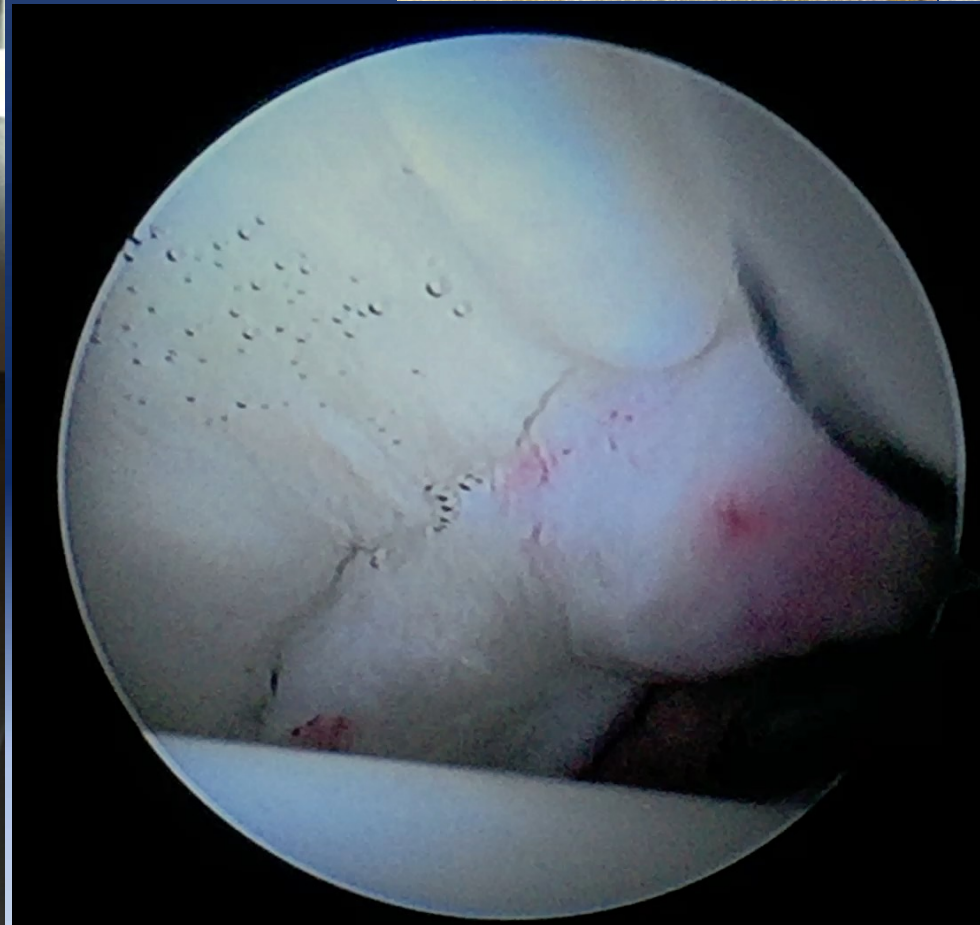
TRATAMIENTO ARTROSCOPICO DE DDC LIMITE



- MUJERES >>>VARONES
- SON MAS LAXAS
- CONFIRMAMOS ROTACION INTERNA CON PACIENTE DORMIDO

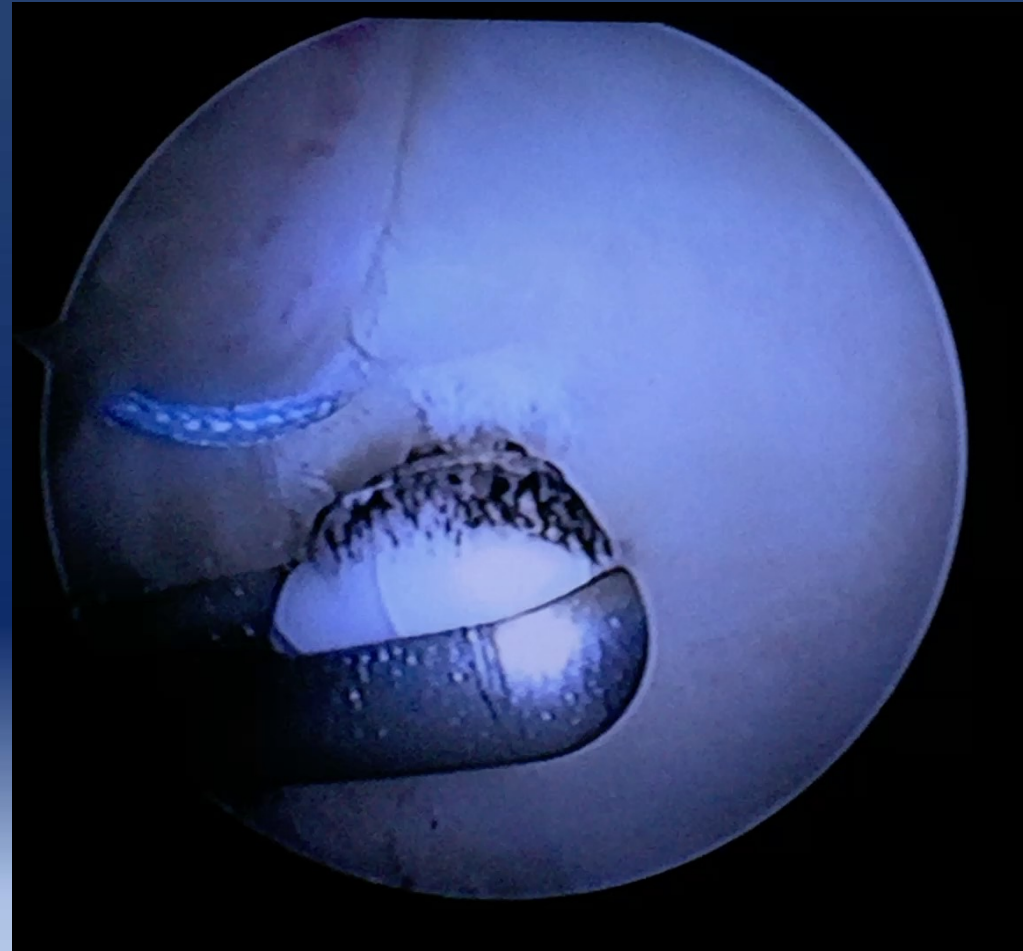
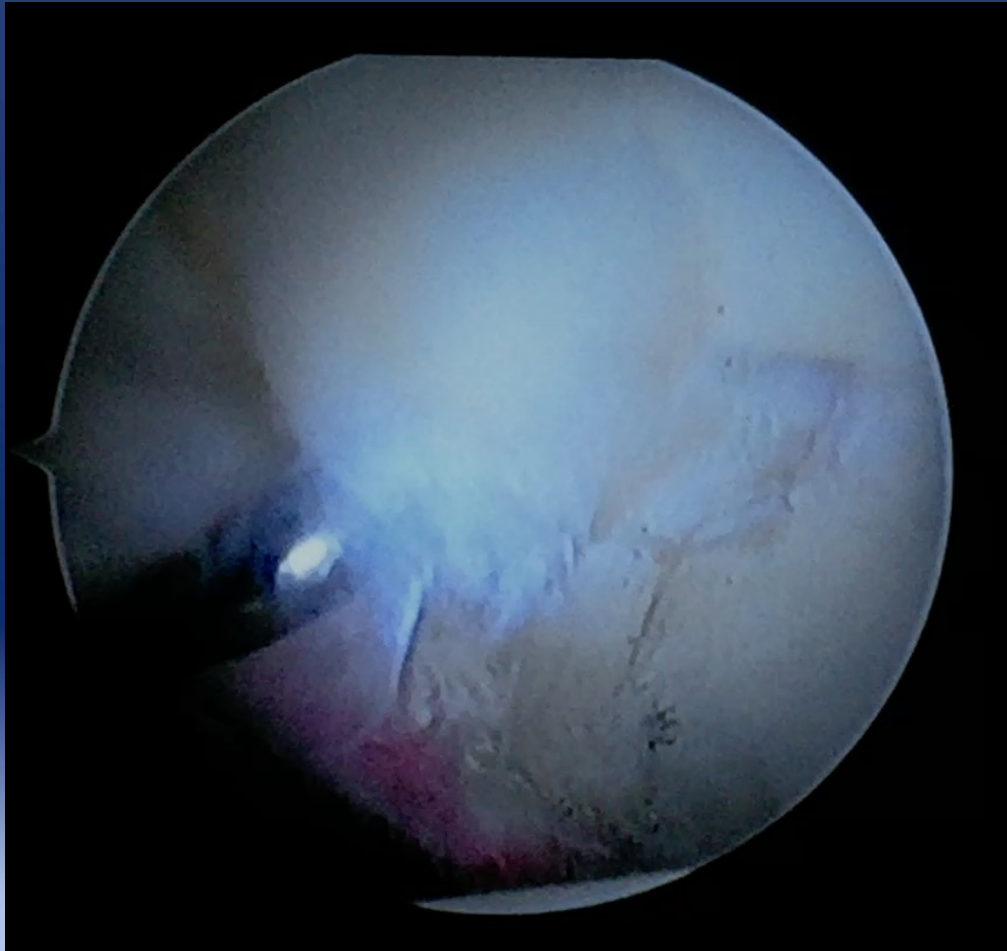


TECNICA QUIRURGICA

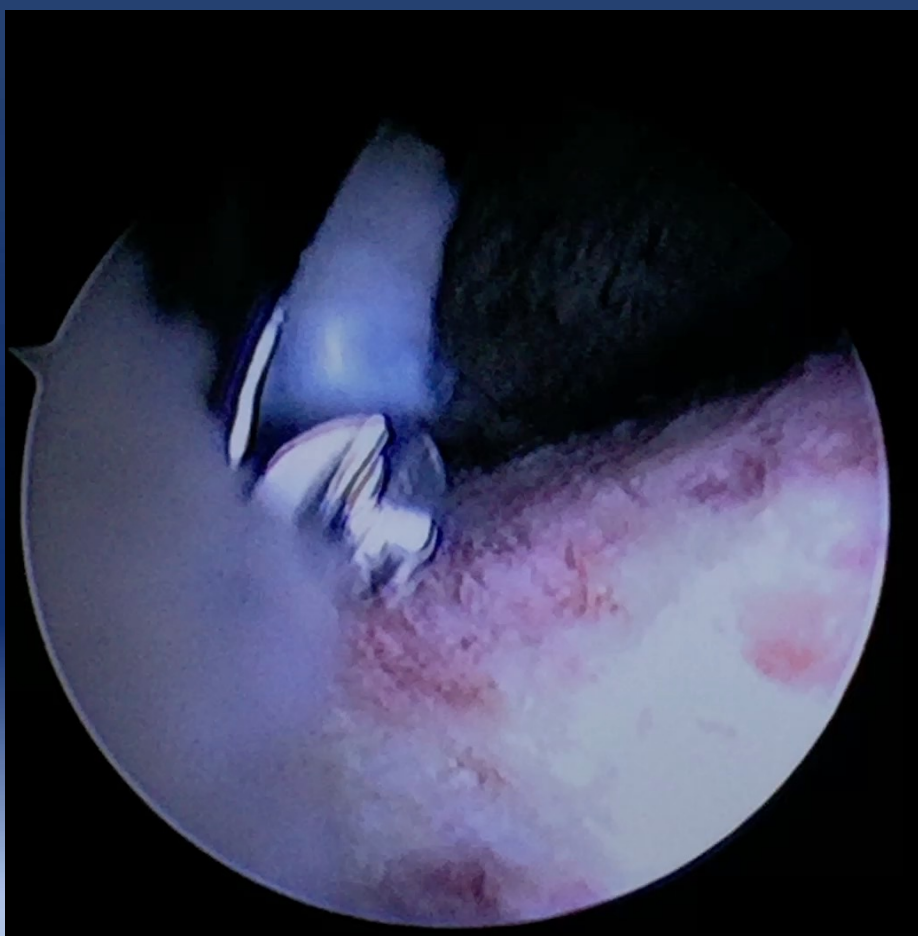
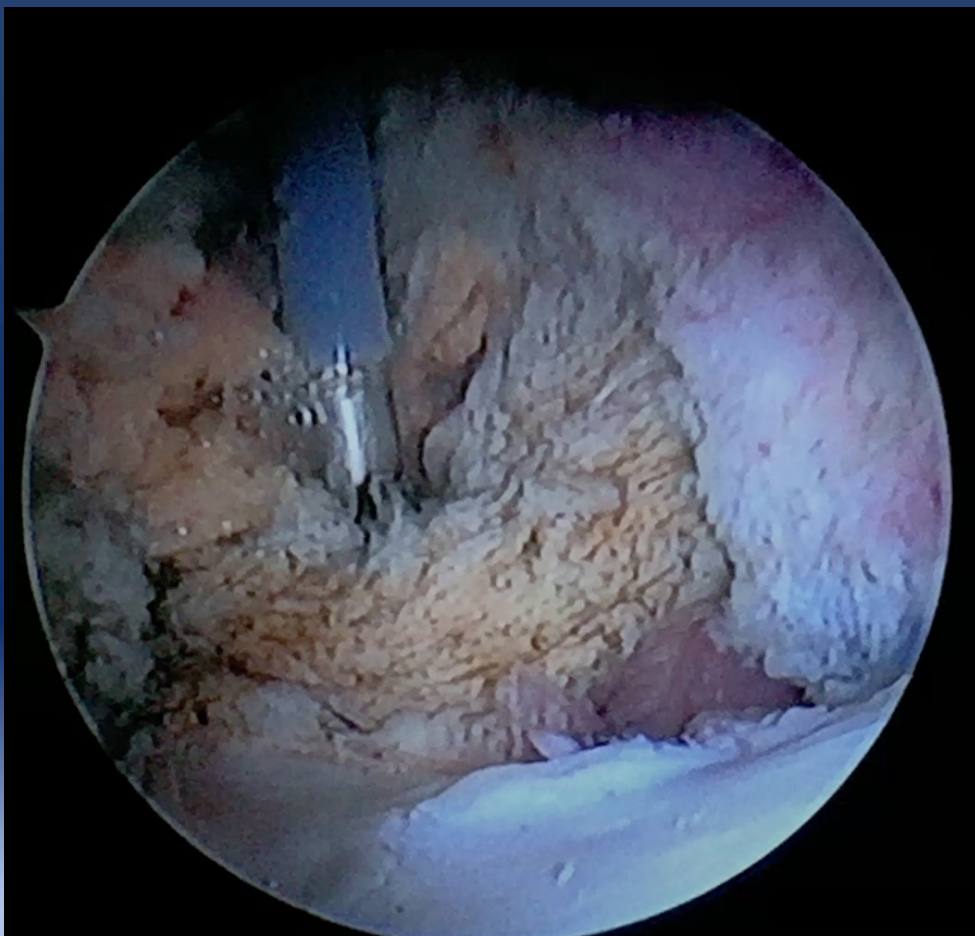


- LABRUM HIPERTROFICO
- LESION CONDRA ACETABULAR
- CABEZA FEMORAL NORMAL
- LIG REDONDO NORMAL

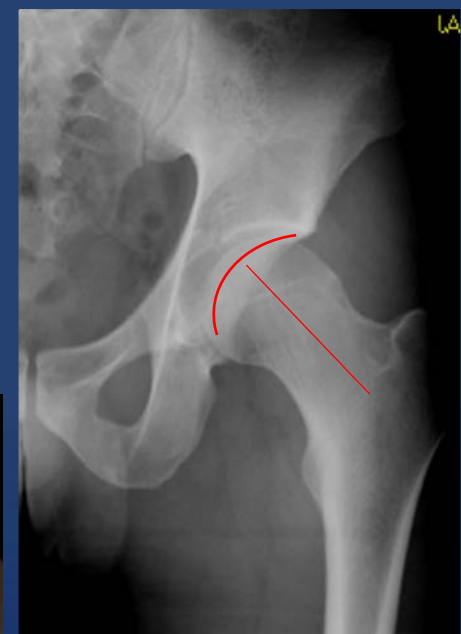
TECNICA QUIRURGICA. REPARACION CONDROLABRAL

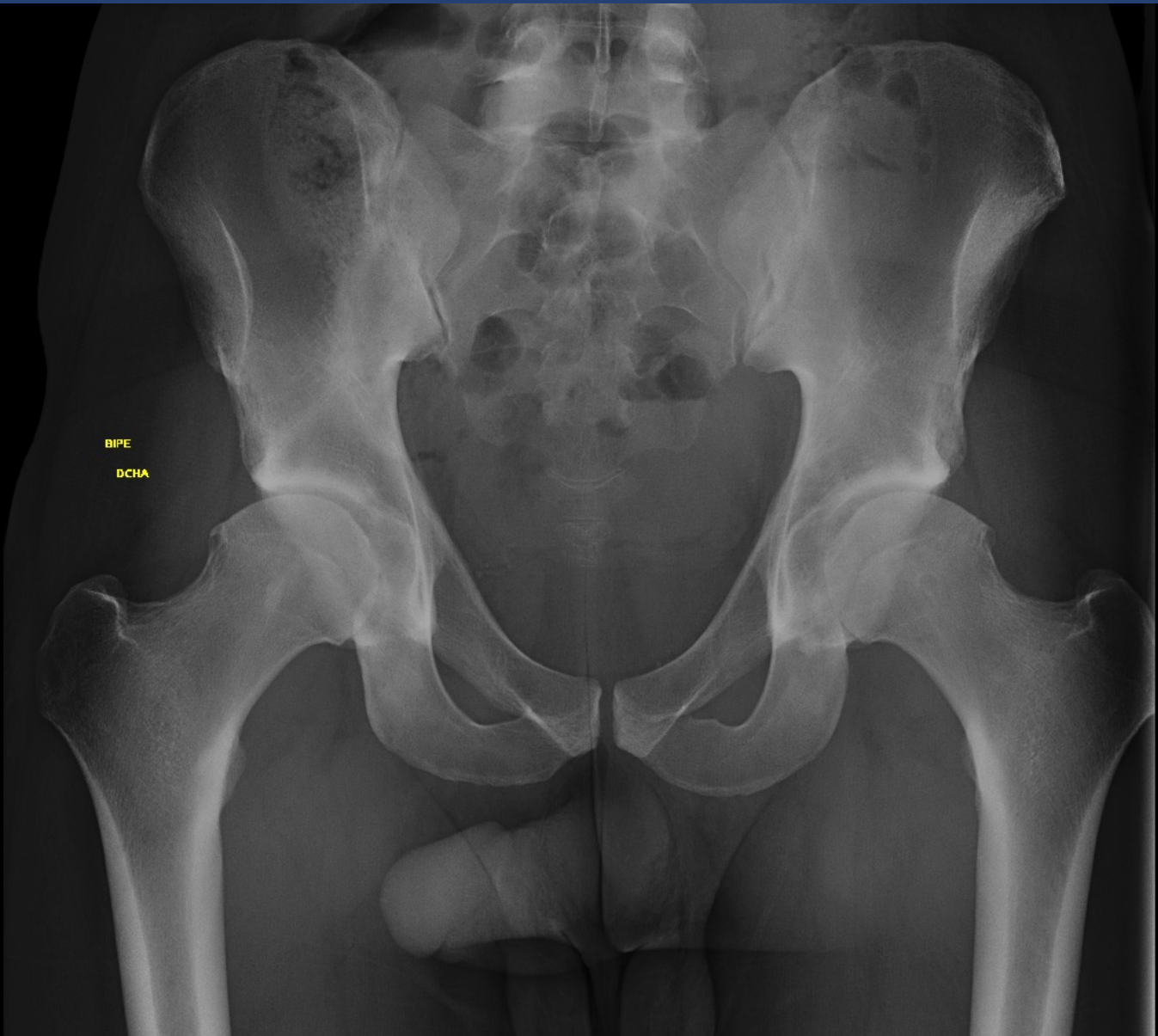


TECNICA QUIRURGICA. FEMOROPLASTIA



TECNICA QUIRURGICA. CIERRE CAPSULAR





RDA 21 octubre 2011

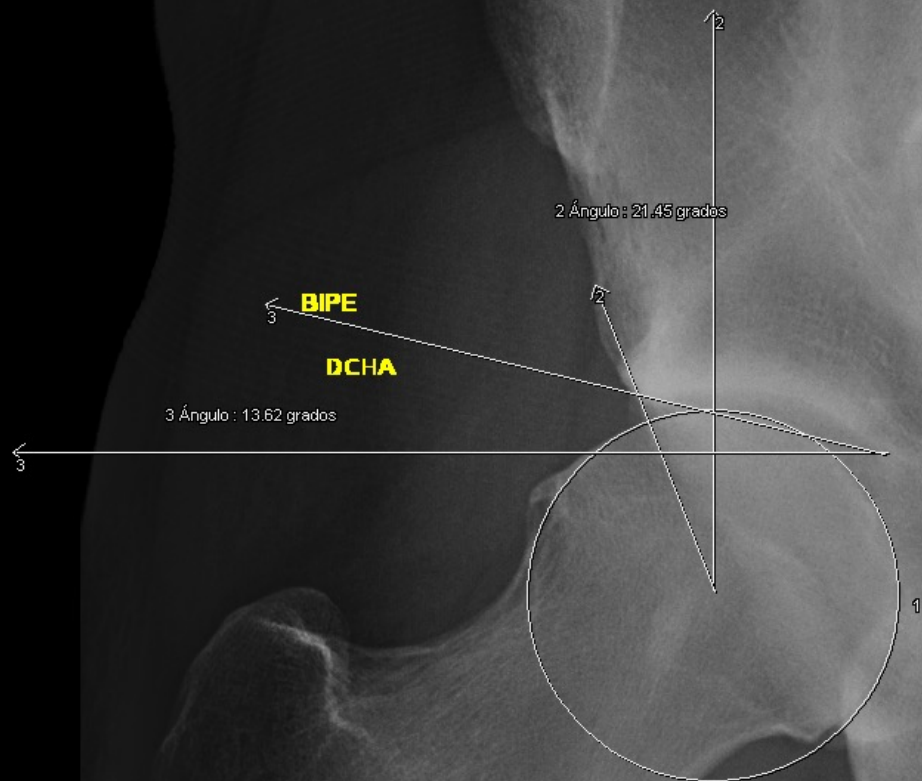
de profundidad. Lesion en union condrolabral.
de lesiones condrales hasta zona estalbe.

regularizacion con control RX bien. maniobras mecánicas

RECHA julio 2012

cm de profundidad. Lesion en union condrolabral.
on de lesiones condrales hasta zona estalbe. .
regularizacion con control RX bien. maniobras

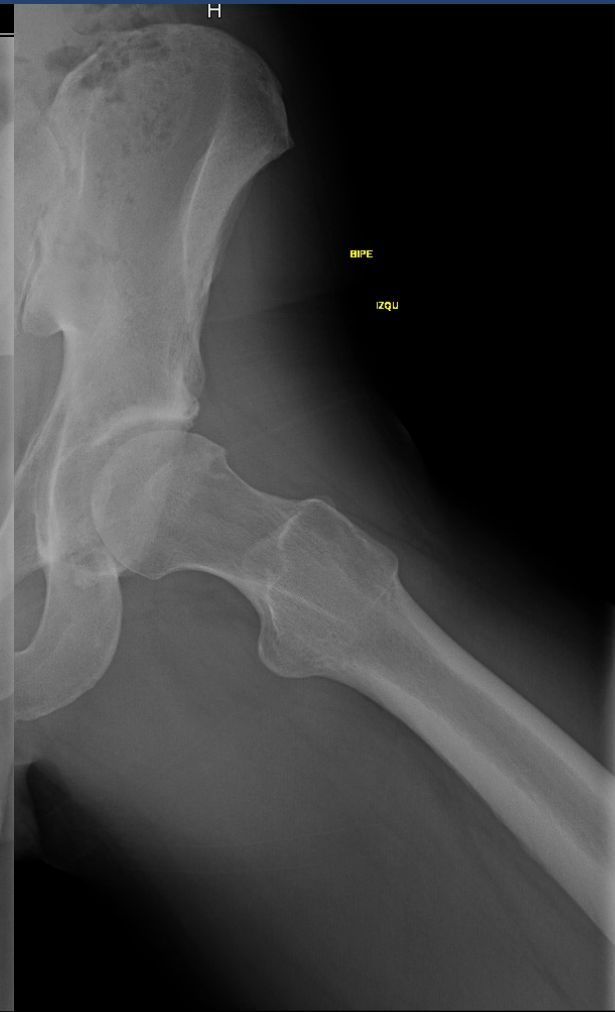
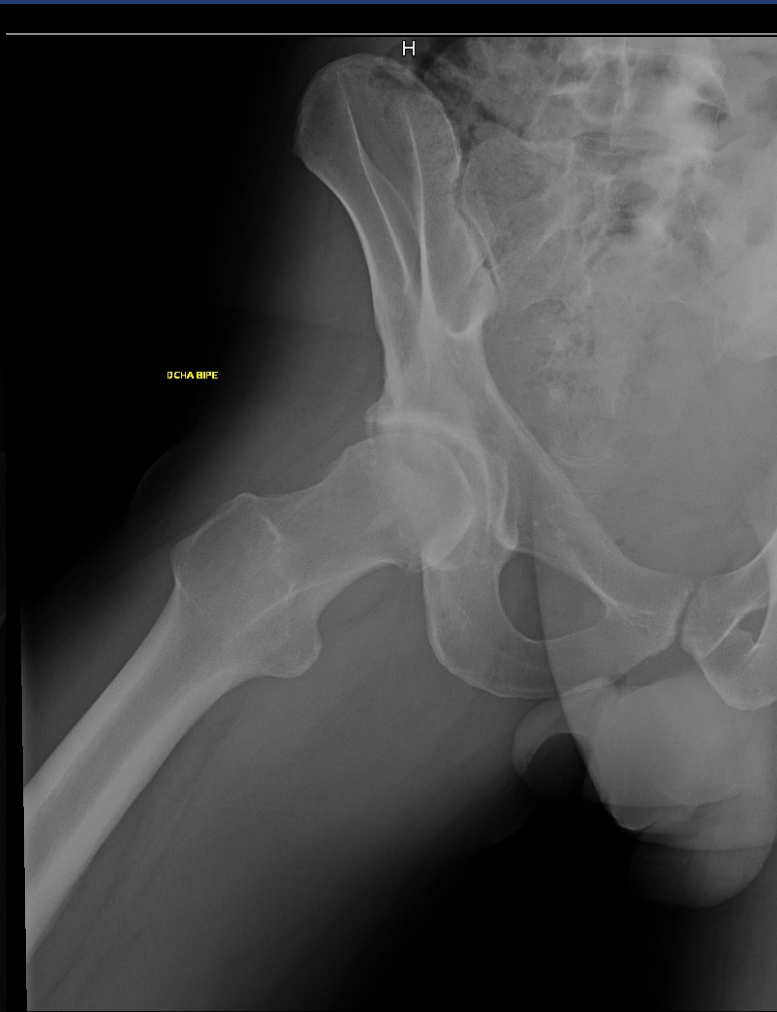
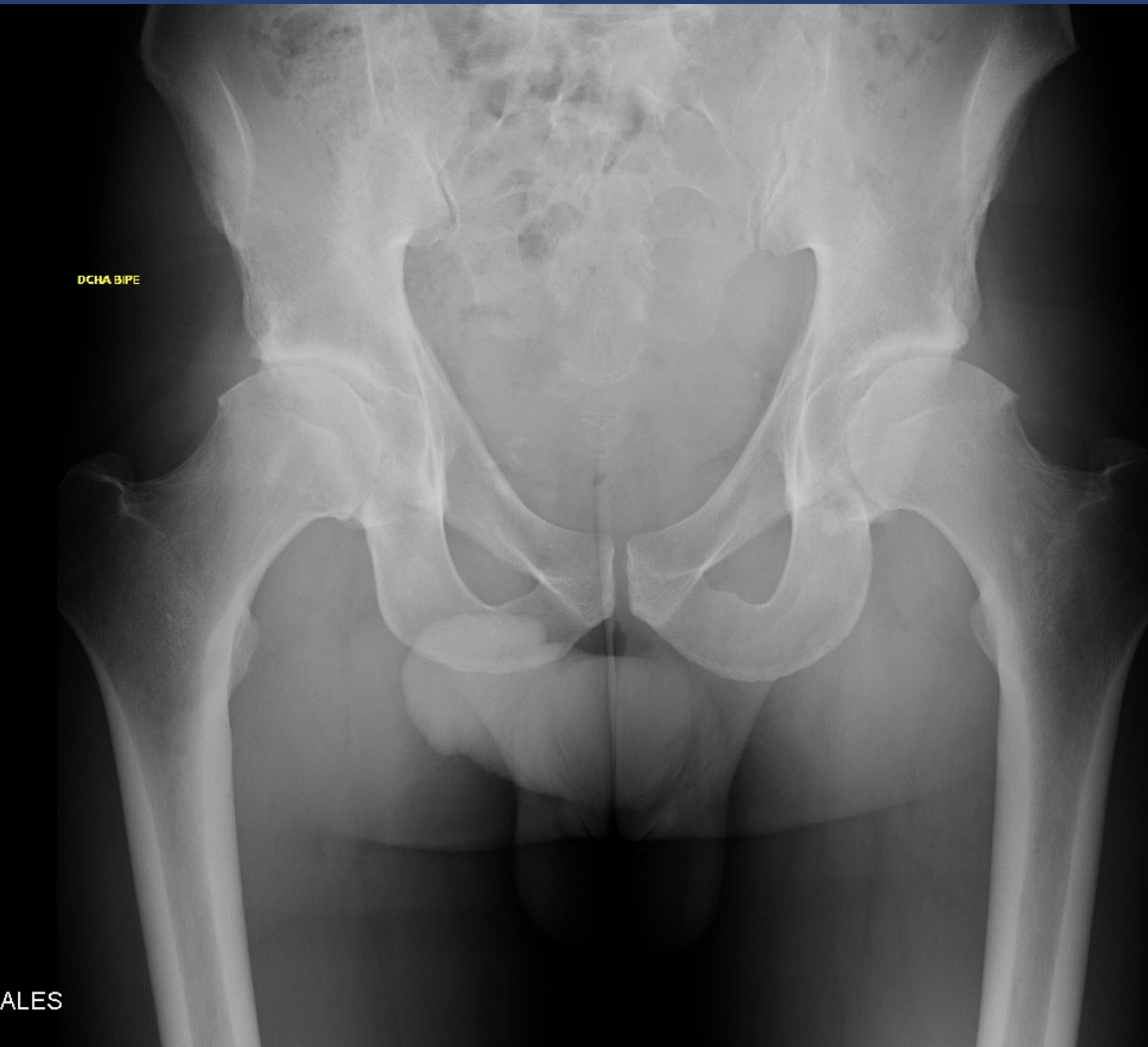
VARON 31 AÑOS. COXALGIA BILATERAL



Vas 8,5

CE < 25°. IA > 10°
DEFORMIDAD CAM
TÖNNIS I





SEGUIMIENTO 8 y 7 AÑOS . Vas 8,5>>>1,5 actual

16015

17

RefPhys: Bartolome Garcia, Se
Model: "Thunder Platf
Patl
CF: 0

DCHA BIPE

AP_Y_AXIALES

W 16
C 8



SARA

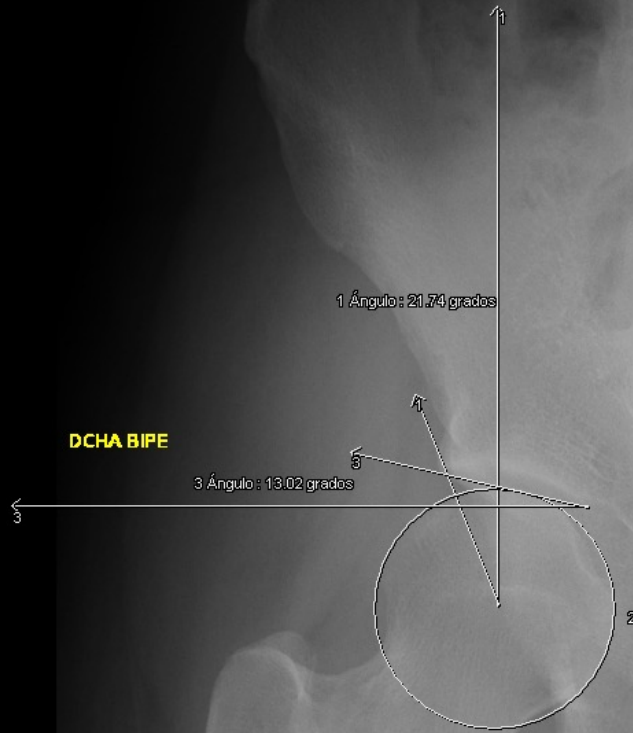
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MUJER 23 AÑOS. COXALGIA DERECHA

LES

3-2017

/2017
0:54

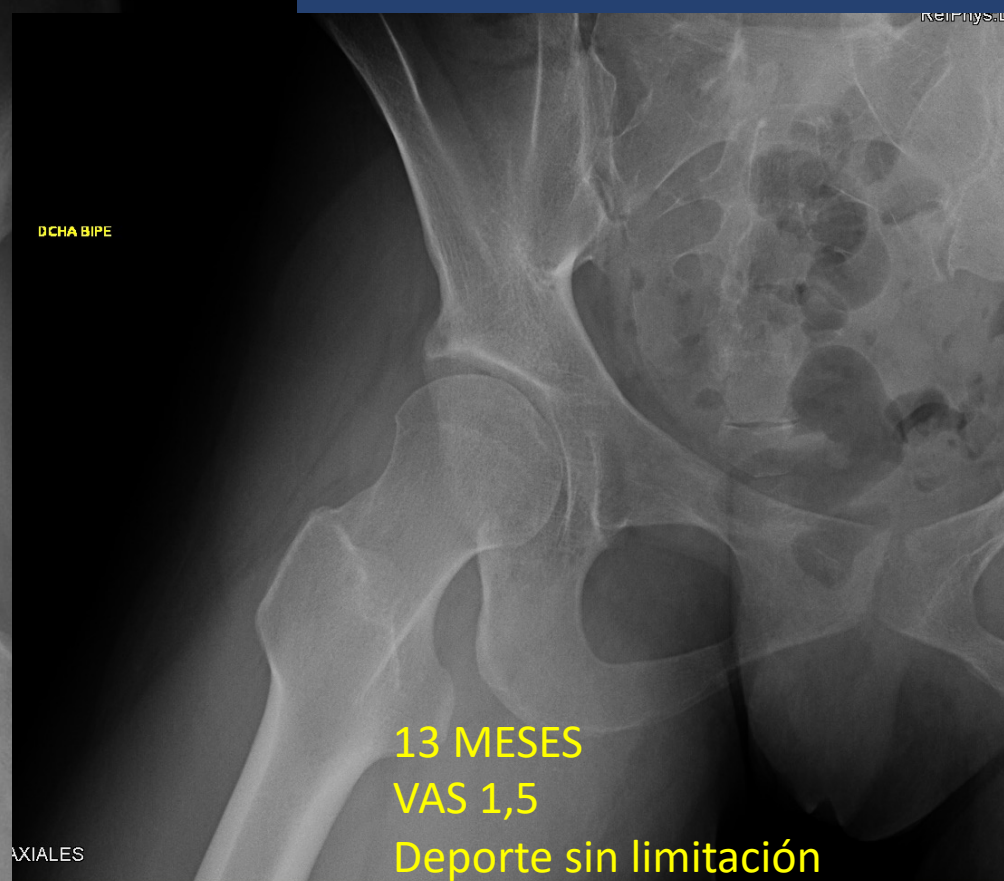
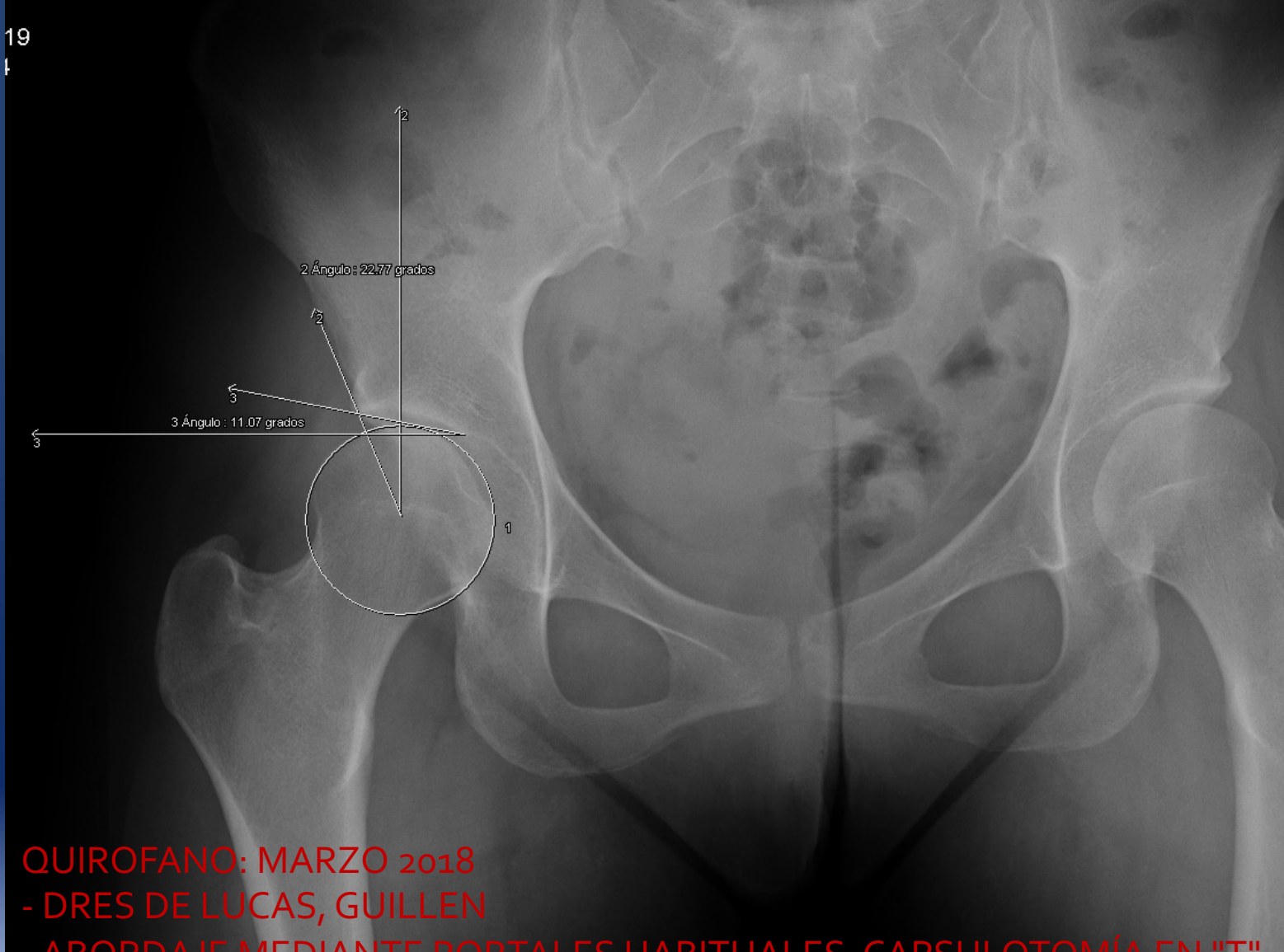


DCHA BIPE

2 Área: 18.72 cm2
2 Mín./máx.: 6913/10857
2 Suma de píxeles: 51433
2 Media/des. est.: 8928.00/49.34

LVIS_AP_Y_AXIALES

CE : 21,7
IA: 13



QUIROFANO: MARZO 2018
- DRES DE LUCAS, GUILLEN

- ABORDAJE MEDIANTE PORTALES HABITUALES. CAPSULOTOMÍA EN "T"

- SE VISUALIZA LABRUM DESINSERTADO CON SIGNO DE LA OLA DE 12 A 3. NO SE VISUALIZAN LESIONES CONDRALES. SE REPARA LABRUM CON 2 ARPONES PUSHLOCK. SE COMPRUEBA BUENA ESTABILIDAD TRAS REINSERCIÓN**
- PERIFERICO: FEMOROPLASTIA. ESCOPIA OK.**
- SE REALIZA CIERRE DE CAPSULA CON 7 SUTURAS FIBERWARE.**

TRATAMIENTO ARTROSCOPICO DE DDC LIMITE. CONCLUSIONES

- Hasta 15% de pacientes tratados en centros con alto volumen de tienen datos de displasia acetabular >>>RECONOCER EL PROBLEMA
- ASOCIACION DDC---DEFORMIDAD CAM (40-90%)
 - Inestabilidad vs pinzamiento???
- Resultados similares a PFA en pacientes seleccionados a corto medio plazo (excelentes resultados +- 80%)

Domb et al. Arthroscopic capsular plication and labral preservation in borderline hip dysplasia: 2 years outcome of a surgical approach to a challenging problema . Am J Sports Med 2103

Larson et al: Arthroscopic management of dysplastic hip deformities: predictors of success and failures with comparison to an arthrsopic FAI cohort. Am J Sports Med 2016

Adler et al. The utility of Hip Arthroscopy in the setting of acetabular Dysplasia: a Systematic Review. Arthroscopy 2019

TRATAMIENTO ARTROSCOPICO DE DDC LIMITE. CONCLUSIONES

- NIVEL EVIDENCIA A LA HORA DE REALIZAR RECOMENDACIONES BAJO
 - Estudios III, IV
 - Series con bajo número de pacientes y seguimiento a corto - medio plazo
- Muy difícil en este tipo de pacientes generalizar una indicación clara de cirugía>>>>INDIVIDUALIZAR Y HACER PARTICIPE AL PACIENTE
- Si la decisión es CAC >>>>seguimiento exhaustivo (Rx 6s, 3m , 6 m , 1^a) y PAO si mala evolución clínica **y-o** radiológica.
- CAC CONTRAINDICADA EN DISPLASIA MODERADA-SEVERA (CE < 18°)

Domb et al. Arthroscopic capsular plication and labral preservation in borderline hip dysplasia: 2 years outcome of a surgical approach to a challenging problema . Am J Sports Med 2103

Larson et al: Arthroscopic management of dysplastic hip deformities: predictors of success and failures with comparison to an arthroscopic FAI cohort. Am J Sports Med 2016

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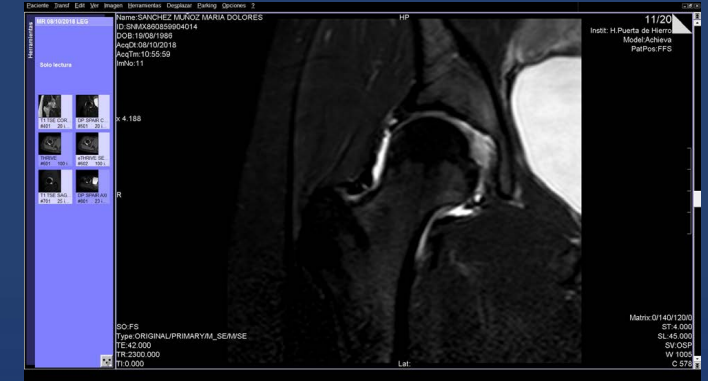
Cac diciembre 2011.

- Lesión labral con desinserción completa y extensión a cartílago entre las 10 y las 2.
- Exposición de hueso subcondral.
- Sinovitis de fosa acetabular.

Gestos:

- Reinserción del labrum con 3 anclajes tipo push-lock
- Perforaciones
- Sinovectomía fosa acetabular.

ptc agosto 2012



- CAC CADERA DERECHA. 11 abril 2019

- INESTABILIDAD EN MANIOBRA DE TRACCION

>>>CENTRAL: LESION CONDRILABRAL DE 11 A 15 HRS CON LEVANTAMIENTO EN TRAMPILLA DE CARTILAGO EN ESA LOCALIZACION DE ESPESOR COMPLETO- LESION PARCIAL LG REDONDO. DESINSERCION LABRAL COMPLETA, CON LABRUM CAIDO E INESTABLE.

SE REALIZA RESECCION DE CARTILAGO INESTABLE, REPARACION LABRAL CON 5 ANCLAJES PUSHLOCK CON BUEN EFECTO SELLADO

>>>PERIFERICO: FEMOROPLASTIA. ESCOPIA OK. CIERRE CAPSULAR COMPLETO CON ANCLAJES PUSHLOCK INTERNA

